cardiology

2009-2010

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Hypertension

"Persistent ↑↑BP > Normal on 3 diff. Occasions under mental & physical rest"

Isolated Systolic HTN
(> 140 / < 90)

Causes

- *A.I. -PDA*
- *Complete HB.*
- *Coarctation of Aorta.*
- *Atherosclerosis*

Complications: if high pulse pr. → Cerebro Vascular Stroke.

Treatment

1) *of the cause.*
2) *if ↑↑↑SBP → Anti-hypertensive.*

Diastolic HTN
(> 90)

	1RY Essential	2RY HTN
• Age	*35 - 55*	*< 35 till 55 yrs.*
• Cause	*Not apparent*	*+ve esp. Renal /Endocrinal*
• FH	+ve	*- ve*
• Course	*Slowly prog. → benign*	*Rapidly prog. → malig. esp. in renal*

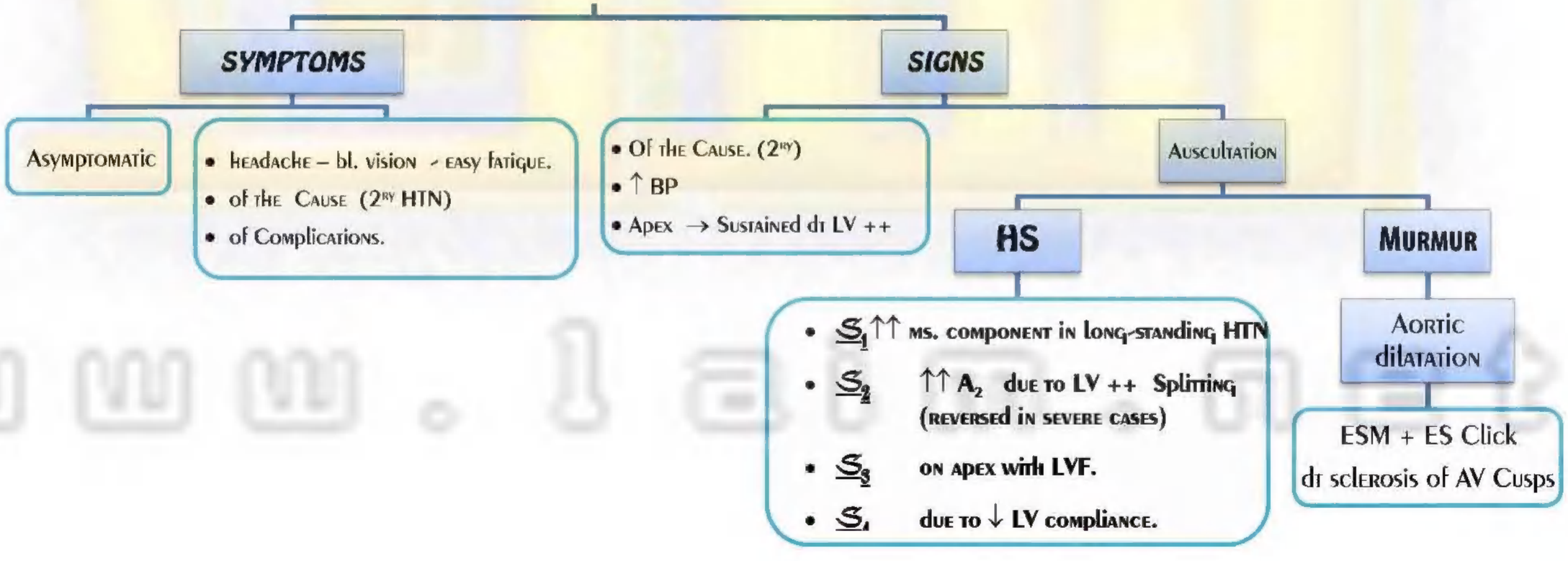
Causes of 2RY HTN

1) Renal	RAS / GN / ARF & CRF.
2) Endocrinal	• Acromegaly - Thyrotoxicosis → systolic HTN • Cushing $ → Na + H2O Rtention + Sensitize T. to CA • Conn's disease → ↑ Aldosterone. • Pheochromocytoma → ↑CA.
3) Neurological	↑ ICT → reflex ↑↑ in Bl. pressure. (Cushing Reflex)
4) CVS	Coarctation of Aorta.
5) Pregnancy	preeclampsia.
6) Blood	polycythemia → hyperviscocity → ↑BP.
7) Drugs	Cortisone + OCP + NSAID → Na & H_2O retention Ephedrine, Erythropiotin and Cyclosporine.

Recent Staging of HTN

Category	Systolic	Diastolic
• Normal:	< 130	<85
• High normal	130-139	85 -89
Hypertension		
• Stage I (mild)	140-159 1	90-99
• Stage II (moderate)	160-179	100-109
• Stage III (severe)	>180	>110

Cl. /P of HTN



MALIGNANT HTN

"RAPIDLY PROG. HTN WITH EARLY COMPLICATIONS DUE TO FIBROID NECROSIS OF VASCULAR WALL"

(CEREBRAL HGE - RF - HF)

Cl./P

- **DBP > 130.**
- **PALLOR** → *vasospasm* + *μ-angiopathic H.A.*
- **FUNDUS** → *macular star* + *papilloedema*

COMPLICATIONS = ORGAN FAILURE

1) **HEART** → HF – ISHD - Diastolic dysfunction – Dissecting Aortic Aneurysm.
2) **NEURO** → Stroke (cerebral hge) – Lacunar infarction
3) **KIDNEY** → CRF in benign essential HTN - ARF in malignant HTN.
4) **EYE** → Retinopathy (silver wiring / Ar-V nipping / Hge – exudates / papilloedema)
5) **DRUGS S/E.**

INVESTIGATIONS

1) **ECG & X-RAY** → *LVF (long standing HTN)*
2) **FUNDUS EXAM.** → *acc. To the stage.*
3) **CAUSE:**
   - *↑ Cortisol - ↑ Thyroxin.*
   - *VMA. - plasma renin*
   - *Na -K (Hypokalemic hypertension)*
4) **KFTs + RENAL ANGIOGRAPHY.**

TREATMENT

1) **REST** *during exacerbation rest in bed*
2) **STABLE CASES** → *moderation of life + avoid stress.*
3) **DIET** → *↓Na Fat CHO + ↑K*
4) **↓ WT** → *true fall inBP in over-wt. pt.*
5) **DRUG THERAPY**

Drug Therapy of Hypertension

DD of Hypokalemic HTN:

1) Conn's $ → ↑ Aldosterone → ↑BP & K excretion.
2) Cushing $ → ↑ Cortisone → ↑ BP & K excretion.
3) RAS → ↑ Renin → ↑ Ang-II → ↑Aldosterone.
4) Diuretics in hypertension.

Special Problems in HTN

HTN + …	Avoid	Give
1) HF	• ββ in (large doses so start by low dose & ↑ gradually). • **CCB .(Verapamil)**	**VD + Diuretics.** (ACE-I or ARBs) (not in PVD)
2) COPD or BA	• ββ(non-selective) → **BS.**	
3) DM	• ββ→ **mask S & S of hypo-glycemia.** → **hyper-lipidemia.**	
4) PVD *(Scleroderma / SLE)*	• ββ→ **block β_2 → un-opposed α → VC.**	
(1-4) Avoid ββ		
5) ISHD	**Avoid Tachycardia:** 1) hydralazine. 2) Nifidipine alone → Add ββ.	1) ββ or **CCB.** 2) **ACE-I.**
6) Pregnancy (Tight Control is Required)	1) ββ (propranolol) → fetal bradycadia. 2) Diuretics → ↓ placental bl. Flow. 3) ACE-I → Teratogenic.	1) α -methyl dopa. 2) Hydrlazine. 3) Atenolol. Labetolol 4) CCB.
7) Renal D.		1) ACE-I (moniter K & s. Cr) 2) Lasix not Thiazides to ↑ GFR 3) Hydralazine. 4) ββ - **CCB.**
8) Malig. HTN	**Avoid rapid ↓ BP** to avoid ↓ T. perfusion dr altered Auto-regulatory mech. → Cerebral damage.	**By infusion then Oral if Stable:** 1) Natrates. "of choice" 2) Na Nitro-prusside. 3) Hydralazine. 4) Labetelol.
9) HTN in Elderly	• ββ → **VC.** • **Thiazides → ↓ Na / K**	1. ACE-I. 2. CCB. (Verapamil – Deltiazam)
10) Diastolic dysf.		ββ + **CCB.**
11) Isolated (S) HTN		**Thiazides**
12) Uni-lat. RAS		**ACE-I "of choice but # in Bilat RAS.**

Hypertensive Encephalopathy

"sudden marked↑ BP→ gush of blood to brain→ diffuse Brain edema → coma without lat. signs."

hypertensive encephalopathy

Diffuse edema by CT scan
(Both sides are affected)

⇓

No lateralizing signs

⇓

Rapid control of BP is required.

واحد ضغطه عالي
و اترمي في الارض فجأة

Stroke

focal lesion
eg. Cerebral hge / lacunar infarction
(one side is affected)

⇓

+ve lateralizing signs

⇓

Compensatory ↑ BP
so rapid ↓↓ of BP is harmful

Treatment of H. encephalopathy:

1) Anti hypert Infusion → hydralazine & frusemide + Nitrate + Na nitroprusside. (Infusion v. slowly ɛ monitoring)
2) Convulsions → Diazepam IV
3) Brain edema → Frusmide Infusion. (# Mannitol to Avoid initial hyper-volemia)

➢ *Refractory HTN M/C = non compliance + inadequate th. + un-known cause (RAS)*

Surgically curable HTN are 2ry HTN

1) RAS - Cushing $
2) Acromegally - Pheochromocytoma.
3) Coarctation of Aorta.

	ANGINA PECTORIS	MYOCARDIAL INFARCTION
DEF	***chest pain attacks due to coronary ischemia,*** ***(transient → no tissue damage)***	***complete cessation of coronary bl. flow*** ***due to occlusive thrombus (prolonged → tissue damage)***
CAUSES	1) ↓ CORONARY BL. FLOW • *Coronary spasm. (prinz-metal)* • *Atheroma.* • *Vasculitis. (♂ = PAN / ♀ = SLE)* • *Thrombosis or emboli. (in IEC)* 2) ↓O_2 TO MYOCARDIUM → *anemia – hypoxia - Hypo-tension.* 3) ↑O_2 DEMAND → *LV++ dt HTN / AS*	(RUPTURED ATHEROMATOUS PLAQUE + SUPERIMPOSED THROMBOSIS) **4 CASES OF MI:** 1) MI → *DVT* → *Pulm. Embolism.* 2) MI → *Arrhythmia* → *HF* → *PE.* 3) MI → *HF* → *ARF* → *(ATN / pre-RF)* 4) MI → *Emboli from Aneurysm* → *hemiplegia.*
CL./P	ANGINAL PAIN + RF • *retro-sternal heaviness.* • *radiates to… jaw - Lt. shoulder – Arm - epigastrium (inf. wall)* • *↑by exertion, ↓by rest or nitrates.* **HEART EXAM. IS ALMOST NORMAL** ***1) HS*** ⇒ *S_4 on apex. (↓V. compliance → vigorous atrial cont)* ***2) MURMUR OF MI*** ⇒ *due to ischemic papillary ms.* ***3) others*** ⇒ *anemia - xanthelasma in hyper-lipedemia.*	**MYOCARDIAL INFARCTION ⇒ *chest pain differs from angina in….*** • *Severe – radiates more.* • *At rest – prolonged.* • *No response to nitrates.* 1) **ANXIETY.** *(sense of impeding death)* 2) ⊕ **SYMPATH** ⇒ *cutaneous VC ⇒ pallor, cold sweating, ↑HR / tremors.* 3) ⊕ **VAGAL** ⇒ *vomiting esp. (inf. wall infarction)* 4) **SINUS TACHYCARDIA & S4.** *suspect* **MI** *if* **RF** + *sudden onset of:* • **HYPOTENSION** (esp. if NITRATES ARE USED) • **DYSPNEA dt HF.** • **ARRHYTHMIA**
NB	ANGINAL PAIN **Never to be** • *Localized.* • *Stitching or throbbing.* (cardiac neurosis) • *< 30 sec. >30 min. except unstable angina.* **PPT by** *Exertion,* *Cold exposure.* *Heavy meals.* *Vivid dreams. (nocturnal angina)*	***Painless infarction*** • *D. neuropathy / Uremia.* • *during coma/ anesthesia.* • *Elderly.* • *Transplanted heart.(denervated)* **MYOCARDIAL INFARTCTION + PE ?!!** EXTENSIVE MI → ACUTE LVF → ACUTE PE RUPTURE PAPILLARY MS. → ACUTE MR → BACKWARD FAILURE

Investigations

1) ECG	1) ↓↓ S-T segment. 2) T- wave inversion. **"If Resting ECG is normal ⇒ Stress test (Treadmill test) or Dobutamine in pt. unable to do exertion"**	ECG changes after 6 hrs. **Trans-mural:** • ↑↑ S-T segment • Path. Q • Inverted T **Sub-endocardial:** • ↓↓ S -T seg. • Non-Q infarction • inverted T
2) Echo or Dobutamine Echo	a) Ejection fraction. b) ventricular damage.	a) Ejection fraction. (prognostic) b) Heart lesion.
3) Cardiac scan	• Reflects Coronary perfusion. (thallium + exercise → ↑accuracy)	• **X ray** pulm edema
4) TLC / ESR /CRP / CPK	• Normal / No tissue damage.	• ↑↑ DT tissue damage.
5) Coronary Angiogram (Diagnostic / Therapeutic) **6) Lipid profile** **s. homocysteine.** **BS.**	**Indications of Angiography:** 1) Angina refractory to medical ttt. 2) +ve stress test. 3) Unstable angina. 4) Unexplained significant chest pain. 5) Post infarction angina.	

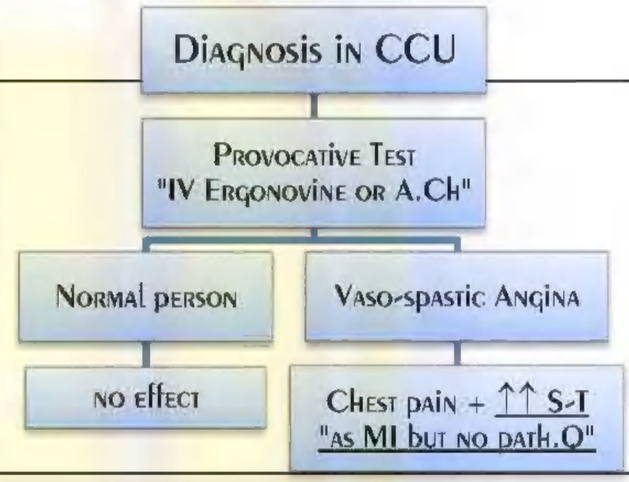
	C K-MB fraction	AST (SGOT)	Cardiac Troponins (v. specific)	Mb (Recent)
Onset	4-6 hrs	12 hrs.	4-6 hrs.	2 hrs.
Duration	2 Days.	3 days	7-14 days	24 hrs.?!

RF for ISHD = for Coronary Atherosclerosis

1) **Age** > 40. *(if young age → Obesity Smoking Stress)*
2) **Sex** ♂ > ♀
3) **+ve FH.**
4) **Stress.**
5) **Diet:** *polyunsaturated fatty acids.*
   ↓ *Anti-oxidants.*
   ↓ *folate and Vit B_{12} → ↑homocysteine.*
6) **DM** → *hyper-insulinism → Atherogenic →* **hyper-tension.**
7) **hyper-lipidemia** → *↑LDL.*
8) **Recent ass.** → *↑s. homocysteine ↑fibrinogen. ↑CRP (h. pylori) / Chlamydia pneumoniae.*

Clinical types of Angina

	Stable	Unstable	Prinzmetal
etiology	stable atheroma in coronaries.	complicated athermanous plague.	coronary spasm in young age.
RF	✓	✓	✗
ccc. of pain	• *Mild.* • *short duration.* • *↑e exertion ↓e rest, nitrates.*	• *Severe & at rest.* • *prolonged. - Frequent* • *↑e exertion …doesn't ↓e rest & nitrates.*	• *Not related to exertion.*
ECG	*↓↓S-T segment* <u>*If Resting ECG is normal*</u> *⇒ stress test (treadmill test).*	*↓↓S-T segment*	
Angio-graphy	*stable atheromatous plaque* Contrast nephropathy dt dye esp. in DM	*atheromatous plaque ± coronary spasm*	



Treatment

Stable

- **Medical TTT. (in Low risk)**
  1) ββ + CCB. (to Avoid ↑ HR)
  2) Nitrates. (only if chest pain)
  3) Anti-platelets.
- **Surgery: (high risk = Coronary Angiography)**

Unstable

hospitalization *TO EXCLUDE INFARCTION (BY ENZYMES).*

Medical
(as Angina)

1) Nitartes infusion
2) ββ / CCB.
3) Anti-Coagulant. (LMWH)
4) Anti-platelet. (Clopidogril)

Coronary Angiography

- 3 vs. disease.
- Left main coronary.
- Ant. Descending

→ Coronary Bypass (CABG) → by Saph. vein or IMA

1 or 2 vs. disease → Coronary Angioplasty (PTCA) → by balloon catheter.

Prinzmetal

1) **CCB Or Nitrates.**
2) <u>ββ are #</u> *to avoid coronary spasm dt un-oppsed α_1 Rs.*

Important Terms:

- **Decubitus Angina** → *occurs on lying down...in LVF.*
- **Nocturnal Angina** → *vivid dreams → wake up the pt. from sleep.*
- **Cardiac $ X** → *Angina + (+ve) exercise test + Normal angiography.* (due to spasm in coronary μ-circulation)
- **Acute Coronary $** → *Unstable Angina or Myocardial infarction.*

Treatment of Myocardial Infearction

Un-Complicated MI

1st Aid

1) Rest –O2 therapy.
2) Nitrates. (SL) "only if good BP"
3) Sedation – analgesia

in hospital "CCU"

1) **M**onitor by ECG.
2) **M**orphia. → Sedation, analgesia. (Lanoxone to avoid S/E)
3) IV cannula → to keep patent venous line.

TTT. of RF: HTN & Bl. Sugar

1) **M**ini dose **heparin or anti-platelets** or both.
2) **M**etoclopramide. (dt vomiting dt inf. wall infarction)
3) **M**easures to ↓ **size of infarction** in the 1st 6 hrs.
4) **M**aintain O_2 sat. > 90%
5) ACE-I → (-) Remodelling.
6) **M**g adjustment → Avoid Arrythmia.

Complicated MI

Early "see below"

1) LVF.
2) Rupture of...
3) Early pericarditis.
4) Ext. of Infarction.
5) Mural Thrombus.
6) Arrythmia.

late "see below"

1) Aneurysm.
2) Late peri-carditis.
3) post-Infarction.
4) Frozen Shoulder.
5) DVT.

Lines of TTT. of Myocardual Infrction

IV ββ (if HR > 120)

Nitrates infusion

if N. BP > 100
"Releive Ischemic pain + in sever PVC"

Thrombolytic "within 6-12 hrs"

1) Streptokinase → Alleergy
2) Urokinase.
3) Recombinant TPA.

Treatment of Complicated MI

Early Complications

Lesion	Cause	TTT.
1) **LVF = HF**	*Extensive infarction*	**4 Ds:** 1) Dopamine / Dob. 2) Diuretics. 3) Digitalis. 4) Dilators.
2) Rupture of:	• papillary ms ⇒ *acute MI ⇒ PE* • IVS ⇒ *acute VSD*	✓+ VR when stabilized. ✓+ Surgery when stabilized
3) Early Pericarditis	• Chest pain → no response to Nitrates. • pericardial Rub.	NSAID. (# heparin → haemopericardium)
4) Extension of Infarction	↑↑ *pain after initial stabilization* (↑ *MB "new marker" within 2 hrs*)	
5) Mural Thrombus	*DT Rough surface of infracted area ⇒ Thrombus ⇒ emboli*	Anti-coagulant
6) **Arrhythmia**	• *V. Extrasystole.* • *V. Tach → VF* • *AF - HB*	

Late Complications

Lesion	Cause	TTT.
Aneurysm + Remodeling (6 wks post-infarction)	*Healed infarction → weak scar ⇒ aneurysm →* *Thrombosis, Arrhythmia, Rupture.* persistent ↑↑S-T >2wks.	1) Anti-coagulant. 2) Anti-arrhythmic. 3) Aneuryectomy.
Late Pericarditis (Dressler's $)	*Damaged Peri & Myocardil cells escape to bl ⇒ ⊕ IR ⇒ Auto-Ab against pericardium.*	Steroids. (# heparin → haemopericardium)
Post infarction Angina Or 2ry Prevention of MI		1) Avoid RF. 2) Nitrates. 3) BB. 4) ACE-I. 5) Emergent Angiography for Revascularization.
Frozen shoulder		Physiotherapy.
DVT → Pulm. Embolism.		

Drug Therapy in Angina

During the Attack

1) Rest - O_2 therpay.
2) Nitrates. (SL) "only if chest pain"
3) Re-assurance after exam.

Inbetween the Attack

1) Diet: ↓ CHO ↓ Fat ↓ Salt.
2) Smoking + Modify life style.
3) of RF → DM / HTN / hyper-lipidemia.
4) Drug Therpay. (se below)

Drug Therapy of Angina

®	Nitrates	β-blockers	DHP	Non-DHP	
			Nifedipine Adalat = pure VD	Diltiazem Dilatiazam	Verapamil Isopin
Mech.	Veno-dilators → ↓ VR *(↓ Work of the heart & ↑ coronary VD?!) used During the Attack to relief the Chest pain*	1) (-ve) ino-tropic → ↓↓ O2 consumption. 2) (-ve) chrono-tropic → ↑↑ coronary filling.	VD +++	++	+
			(-ve) Ino & Chrono. ×	++	+++ (Anti-arrhythmic)
Uses	1) Myocardial Infarction. (if chest pain) 2) Oes. Spasm & Acalaxia. 3) PVC. 4) Biliary colic. 5) h. Encephalopathy.	**CVS uses (not Indral)** ▪ *HTN* ▪ *Angina* ▪ *Arrhythmia* ▪ *Cyanotic spills* ▪ *MV prolapse.* ▪ *HF (start low d. then ↑ gradually)* **Non CVS uses (propranolol = Indral)** **30 -60 mg:** *Glaucoma. Fine Tremors. Parkinsonism.* **60-120 mg:** *Thyrotoxicosis.. (↓T4 →T3) PH. (sphincteric VC) Migraine. (cross BBB)*	1) H. encephalopathy. 2) PVD. **NB:** 1) Nimodipine. *"in sub-arachnoid hge dt reflex Cerebral VC.* 2) Cinnarzin in TIA.	1) SV Arrhythmia. 2) HOCM. 3) Angina (even vaso-spastic)	
S/E	*Transient Headache.* *Hypotension esp. e other VD.(so take in bed)* *Tolerance on ch. use.*	*Bradycardia upto HB.* • *BS (if non-s)* *HF.* ▪ *Sudden stoppage →angina* *Depression.* ▪ *Fatigue.* *Night mares. "indral"* • *Impotence.*	1) *Reflex ↑HR … Acute ISHD. (so Add ββ)* 2) *Hypo-tension.* 3) *Headache. "transient"* 4) *LL edema → Diuretics.*	1) *HF except* Amlodipen. *"slow & long acting" → no marked ↑ HR… protect the hrt"* 2) *HB.* 3) *Constipation Esp. "Verapamil"*	

Routes of Nitrates:

1) SL / Spray → Glyceryl Tri-natrate … *relieve attack with in 5 mns, ± Repeated.*
2) Oral → DiNatra. "Effox" 20 mg TDS. (Iso-sorbide Mono-Nitrate)
3) Inhalation → Amyl nitrate.
4) Ointment → at night.
5) IV → in Unstable angina & MI.
6) TD patches → long acting.

▪ Sildenafil (viagra) *in pt. taking nitrates.*

Non selective	Selective
▪ Propranolol (Indral)	▪ Atenolol (Tenormin)
▪ Nadolol. (Cor-gard)	▪ Bisoprolol. (Concor)
• Sotalol (β-core)	

Lipophilic	Hydrophilic
• Cross BBB.	• Can't cross BBB.
• Hepatic	• Renal
• Short ½ life.	• Long ½ life.
• Propranolol	▪ Atenolol / Nadolol.

Drugs	Use	Side Effects
1) Dieuretics		
a) Thiazide (25-50 mg) **b) Indapamide** (VD + Thiazide)	**Moduretic** (Thiazide + Amiloride) **Aldactazide**	*1-Hypertension + HF* *2-Hypertension + DM*	*1-hypokalemia* ***Add*** *(Spironolactone or Amiloride)*
c) Furesamide **Lasix** **lasilactone**	لا يعطى الا ف ظروف معينة: • *H encephalopathy* • *H+ Renal D. (↓GFR)* • *↓GFR < 25 ml. / min*	*1-hypokalemia ..* *2-hypovolemia* ***Avoid*** *use for long time*
d) Spirono-lactone **Aldactone**	*1-Conn's $* *2-with other diuretics* *3-Hypertension + HF*	*1-hyperkalemia* ***Monitor*** *K level.* *2-gynaecomastia* ***Use*** *Amiloride or Triametrine*
NB: AVOID all diuretics in pregnancy as they ↓ placental blood flow.		
2) β Blockers		
1-Propranolol **Indral.** "v. short acting"	*1- H+IHD* *2- H+ Diastolic dysf.*	*1) BS ⇒* ***Avoid*** *in BA* *2) VC of peripheral vs ⇒* ***Avoid*** *in PVD* *3) fetal bradycardia ⇒* ***Avoid*** *in pregnancy* *4) mask hypoglycemia ⇒* ***Avoid*** *in DM* *5) (-ve) ino & chrono* ***Use*** *low dose in HF*
2-Carvidolol (VD → TIT. of PVD) **Dilatrend**		
3-Atenolol **Tenormin**		**4 & 5**
4-Biso-prolol **Concor**		
NB: Carvidolol is a VD so used in PVD		
3) α Blockers		
a) Prazosin **Minipress**	*1- PVD*	*1-1st dose hypotension ⇒* ***Start*** *low dose & on going to bed.* *2-Tachyphylaxis.*
b) Doxazosin **Cardura**	*H+ Senile prostate.*	
c) Labetolol	*1) Pheocromo-cytoma.* *2) H + pregnancy*	

Drugs		Use	Side Effects
4) Centrally Acting Drugs			
1) α Methyl Dopa	**Aldomet**	*H+ Pregnancy* *Refractory HTN.*	*1) depression **Add** antidepressants* *2) extra-pyramidal manifest.* *3) Auto-immune hepatitis& AIHA*
2) Clonidine	**Catapress**	*1-H* *2- post menopausal flushes*	*1) Na &water retention ..**Add** diuretics* *2) rebound HTN…**Gradual** withdrawal*
3) Reserpine	**Brinerdine**	**HAS no role in recent medicine**	*(1 & 2) as methyl dopa* *+ nasal congestion*
5) Vaso-dilators			
a. Arterial VD			
1) Hydralazine	**Apresoline**	*1) H encephalopathy* *2) H + Pregnancy.*	*Reflex ↑HR → ↓↓coronary filling* *→ **Avoid** in IHD / SLE like / flushing.*
2) CCBs ▪ Cerebral. ▪ Coronary ▪ periph. VD -ve Ino & Chronotropic	**See ISHD.**	*1) H + BA* *2) H + DM* *3) H + ISHD* *4) H + Pregnancy* *5) H + Diastolic dysf.* *6) H + PVD* *7) H in elderly*	
3) Diazoxide		*1) H encephalopathy.* *2) Insulinoma.*	*(-) insulin release **Avoid** in D.M*
4) Minoxidil		*Topically for alopecia*	*Hyper-trichosis*
b. Veno-dilators			
Nitrates inf.	**Tridil**	**See Angina + H. Encephalopathy.**	
c. Mixed VD			
1) Na nitro-prusside	**Niprid** **"v. potent"**	*1-H encephalopathy* *2-Cardiogenic PE*	**1)** *Hypotension. (sever)* **2)** *Cyanide toxicity in liver D. (pink color / dilated pupil)* **3)** *Thio-cyanate toxicity in Renal D. (Tinnitus / skin rash)*
2) ACE-I (↓ANG-II…→ VD / ↓ Aldosterone)	**Capotin** **Tritace** **Ezapril** **zestril**	*1) HTN.* *2) HF. (↓Remodeling)* *3) D. Nephropathy ↓IGP dt VD of eff. A.(Reno-protective)* *4) Renal HTN.*	*1) chronic dry cough ⇒ **Use** ARBS* *2) hyperkalemia ⇒ **Monitor** K / s. Cr.* *3) Nephrotic $. **(Membranous GN)*** *# in pregnancy⇒ teratogenic.* *# in Bi-lateral RAS.*
3) ARBs	**Cozar** (Losartan) **Tareg** (Valsartan)	*As above but **no cough.***	

TACHY-ARRHYTHMIA

Sinus Tachycardia	PAT	PUT	Atrial Flutter	Atrial Fibrillation
SAN discharges impulses > 100 – 160 / m	paroxysmal attack of ectopic focus in atrium > 200 / m (regular Tachycardia)	paroxysmal attack of ectopic focus in Ventricle > 200 / m (regular Tachycardia) (no retrograde conduction)	ectopic focus in atrium > 200 / m (regular) ⇓ presentation according to the A -V block.	Multiple ectopic foci in atrium discharge 400-600 / m. (v. rapid Irregular) ⇓ presentation according to the A -V block.
		A-V Dissociation → V. follows focus; Atria follows SAN	Short-lived Arrythmia → return to SAN; progress to AF	M/C sustained Arrythmia → ↑ HR; ↓ HR "slow AF in Digitalis Toxicity"

➢ Causes

1) Functional • Stress, excess coffee, smoking. ▪ Pregnancy, fever. ▪ Anemia, Thyro-toxicosis. **2) HF** (v. common) → compens. ↑HR. **3) Drugs** • Atropine - B_2 agonist. ▪ Thyroxine • VD. (Nifidipine) • Sympathomimetic. (ttt. of COPD / BA) • EI due to Diuretics / Laxatives.	**1) Functional:** stress, excess coffee, smoking **2) Drugs:** Sympathomimetic. (ttt. of COPD / BA)	**Diseased Heart** ▪ Ischemic H.D ▪ Cong. H.D ▪ Rheumatic H.D • Myocardial infarction. ▪ Digitalis Toxicity. → V. Extra-sytole → VT → VF. ▪ Abuse of Anti-Cholinergic (TCA- Anti-histaminics)	**Organic HD.**	**↑ LA pr. / ↑ LA dilat.** 1) Rh. MS (↑LA pr.) 2) ASD (LA++) 3) ISHD (↓V. compliance → ↑LA pr.) 4) HTN (LV++ → LA++) 5) Constrictive Pericarditis. (Catching of LV → ↑LA pr) 6) IEC. 7) Thyrotoxicosis. (Thyrocardia) 8) Pulm emb → Acute pr. Load on RV. 9) Wolf Parkinson White $. (Additional pathway) 10) Lone AF. (unknown cause)

➢ Cl./P of Arrhythmias

	S. Tachycardia	PAT	PVT	Atrial Flutter	Atrial Fibrillation
1) palpitation	أوصف نفسك و انت طالع السلم			As PAT	
▪ onset	Gradual	Sudden	Sudden	Sudden	Irregular
▪ offset	Gradual	Sudden	Sudden	Sudden	occurs at Rest.
▪ rhythm	Regular	Regular	Regular	Regular	
▪ duration		Variable	Variable	[illegible] arrhythmia then turn to → SAN or AF.	Sustained Arruthmia.
▪ what ↑ or ↓	↑↑ by exertion	Recurrent & free in bet. attacks			↑↑ with exertion
2) ↓COP symptoms (Dizziness / Syncope)	✗	✓	✓	✓ dt severe tachycardia	✓
3) of the cause	Anemia / Thyro-toxicosis	Palpitation then Chest pain ...Arrhythmia. Chest pain then Palpitation ...ISHD.	ISHD / MI.		
Cardiac Signs					
1) pulse ▪ Rate ▪ rhythm	100 – 160 Regular	up to 200 Regular	up to 200 Regular	Tachycardia. (Regular) Ventricular rate = ½ Atrial (2:1 AV block)	▪ Irreg. irregularity (↑↑ e exertion) ▪ Pulse deficit > 10 /min.
2) BP.	Normal	↓↓ BP dt ↓ heart filling	↓↓ BP dt ↓ COP	↓e sever Tachycardia	variable (Average of 3 times)
3) Carotid massage	✓	✓	✗	✓	✗ (dt multiple foxi)
4) Resp. sinus	✓	✗	✗	✗	✗
5) Neck Veins = Canon wave	✗	✗	✓ ... intermittent (A-V dissociation)	✗ (Rapid, multiple A waves before each V wave)	absent A wave.
HS	↑ S_1 & S_3 gallop on apex dt HF	↑ S_1	occasional Canon sounds.	↑ S_1 + Murmur.	S_1 variable + Murmur.
Invest. 1) ECG. (Holter in bet. attacks) 2) Echo. 3) of the Cause.	Sinus R. > 100 / m. 1) Thyro → T_3, T_4, TSH. 2) Anemia → Hb. 3) Diuretics → Mg / K.	Deformed P waves: 1) Rapid > 200/m. 2) Regular. 3) Narrow QRS. "Normal"	1) Rapid. 2) Regular. 3) Bizarre shaped QRS. ➢ ↓ s. K & Mg.	1) Saw tooth app. (Flutter waves)	1) Irregular rhythm. 2) Absent P wave. 3) T_3, T_4, TSH.

Treatment of Arrhythmia

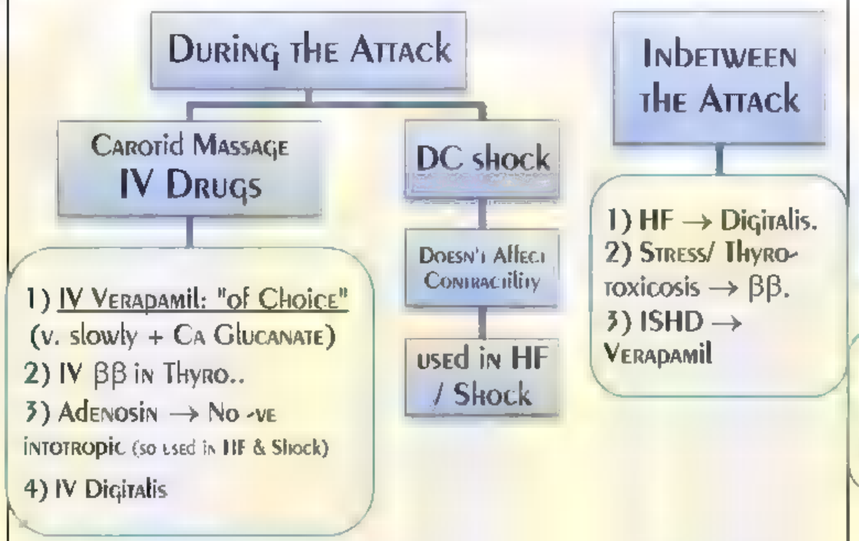
S. Tachycardia

Only if Symptomatic

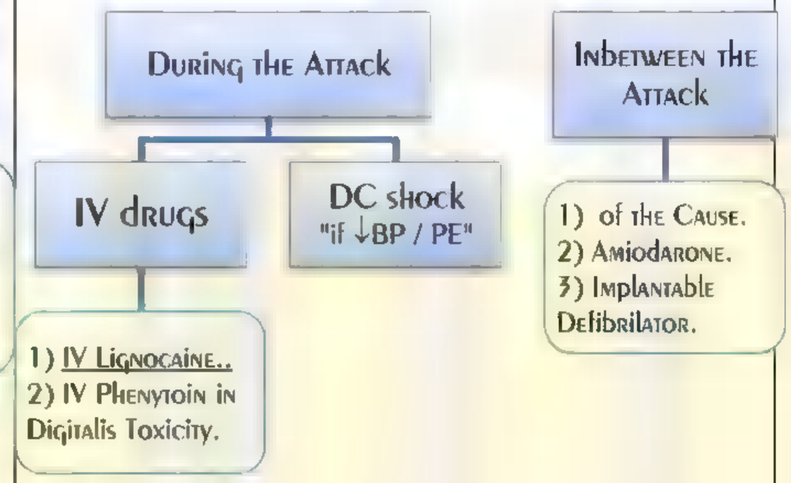
1) **Avoid RF:**
   - *smoking.*
   - *Caffeine.*
   - *Chocalate.*

2) ββ → **Concor cor**

PAT



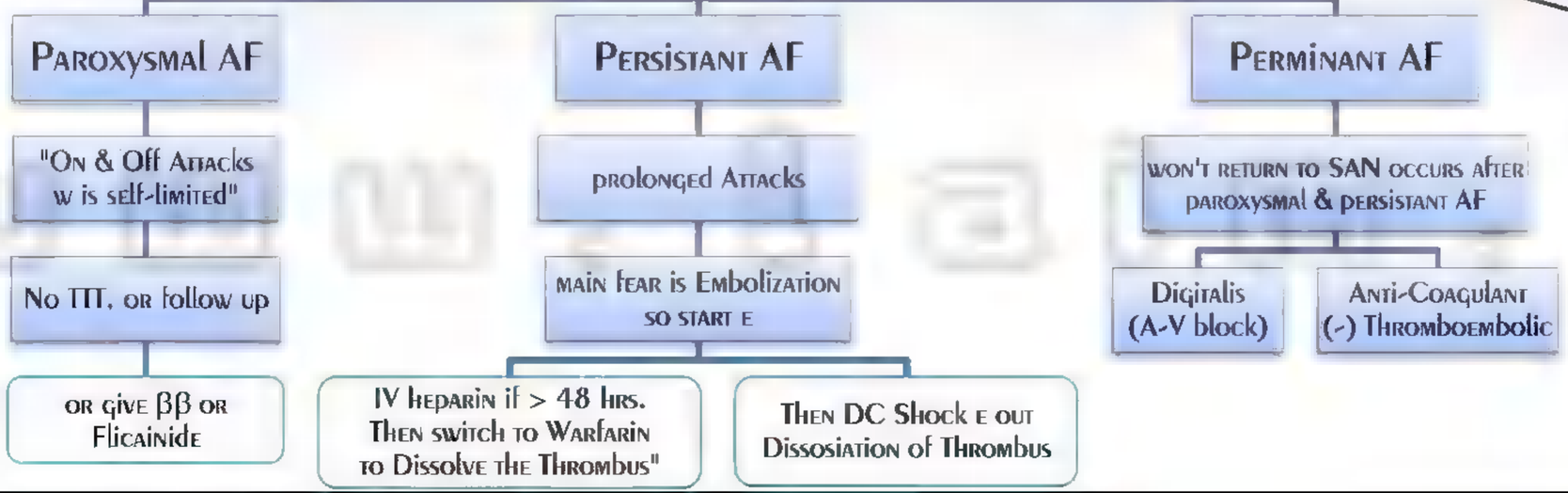
PVT



Atrial Flutter

1) **DC shock.**
2) **ββ.**
3) **CCB. "Verapamil"**
4) **Digitalis.**

TTT. of Atrial Fibrillarion



Complications of AF:

1) **Stagnation of bl. in LA**
   →Thrombo-emboli to brain→
   Cognitive dysfunction.→ so do **MRI.**
2) **Angina dt ↑ HR ∎ ↓ COP.**
3) **Aggravate HF ∎ PVC.**

	EXTRA-SYSTOLE	sinus Bradycardia
	extra beat .... dropped or strong beat	**HR < 60 /m. (SAN is the pace maker)**
CAUSES	**1) FUNCTIONAL:** ▪ *Smoking / Stress* ▪ *Excess Coffee.* ▪ *↓Mg.* **2) RHEUMATIC HD.** **3) DRUGS (↑ HR)** → *Sympatho.. / Digitalis toxicity. (bi-geminy)*	**1) Physiological** → *Sleep & Athletes.* **2) Obst. JAUNDICE** → *Bile salts* → Θ *SAN / AVN.* **3) hypothyroidism:** • *f e constipation.* • *HR = 62 /m* • *Skin abnormality. "Myxedema"* **4) BRAIN TUMOR → ↑ ICT → ↑ SBP / ↓ HR.** (OR SUB-ARACH. HGE) (CUSHING REFLEX) **5) DRUGS** → *BB - CCB - -digitalis*
C/P	**1) PALPITATIONS: (OCCASIONAL)** ▪ *irregular at rest &* ▪ *↓↓ with exertion.* **2) Of the CAUSE.**	**1) ASYMPTOMATIC.** **2) ORTHOSTATIC HYPOTENSION** *in hot weather.* **3) Of the CAUSE.**
SIGNS	▪ **PULSE** → *regular irreg. or occasional irreg.* ✓ *Pulsus bigeminy or Trigemny.* ✓ *Pulse deficit < 10* ▪ **BP** → **NORMAL.** ▪ **CAROTID MASSAGE** → × ▪ **NECK VEINS** → × *Local examination:* S_1 *variable intensity*	• **PULSE** → < *60 / m. (regular)* • **BP** → *normal.* • **NECK VEINS** → × • **Resp. SINUS** → ✓
INVEST.	**1) ECG / Echo.** **2) T_3 T_4 TSH.** **3) K – Mg.**	**1) Echo & ECG → ↓ HR + SINUS RHYTHM.** **2) T_3 T_4 TSH.** **3) CORTISOL LEVEL.**
TTT.	**1) Of the CAUSE** **2) No ttt. as long as no ORGANIC HD.** **3) In irritable person** → ββ. **4) Dang. EXTRA-SYSTOLE → MUST BE TTT. by AMIODARONE.** • *frequent - multi- Focal* • *Ventricular → VT → VF.* • *Diseased beat.*	**(No safe drug to ↑BP or ↑HR)** **TTT. of Idiopathic hypotension:** (dt ↓ sympathetic outflow) **1) plenty of fluids + ↑ SALTS.** **2) ACITONIN H.** *"Aldosterone Analogue"* **3) Sympatho-mimetics "Midodrin®"** *(upto 3 / day* قرص عند اللزوم*)*

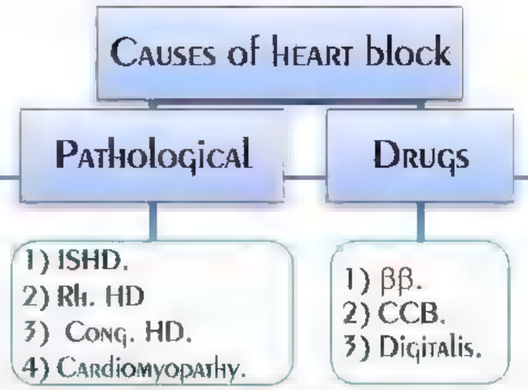
IMPORTANCE OF NECK VEINS IN ARRHYTHMIA.

1- AF & A. flutter.
2- extrasystole.
3- V. tachycardia.
4- Complete HB.

AMIODARONE IS USED IN TTT. of:

1) PAT.
2) V. TACH. (IN-BET. ATTACKS.)
3) DANG. EXTRA-SYSTOLE.
4) Wolf –PARKINSON WHITE $.

Heart Block



1) SAN block → failure of SAN to ⊕ Atrium.
2) BBB → Rt. BBB → wide splitting S_2 → ECG findings.
   → Lt. BBB → reversed splitting S_2 → ECG findings.
3) A-V Block→ 3 degrees (see below)

	1st degree HB	2nd degree HB	3rd degree HB = Complete HB
	ECG finding = Fixed ↑ P-R interval	partial HB So Some impulses fail to pass from A→V	A-V dissociation → Idio-ventricular rhythm.
Cl./P	Not dangerous & occurs physiological during Sleep & in Athletes. dt ↑ Vagal tone.	▪ Asymptomatic ▪ Bradycardia. ▪ ↓ COP → Adam's Stock Attacks in Mobitz II → ▪ *impulses will pass from A to V → transient arrest → syncope.* → ⊕ *Idio-ventricular rhythm → patient regains lost consciousness.* (Recurrent Syncope)	▪ Palpitation. (regular - slow) ▪ ↓ COP - Adam's stock attack. *(Recurrent Syncope)* **Signs** ▪ Pulse < 60 (35 - 40 /m - Regular) ▪ ↓↓ BP or Systolic HTN *(acc. to the myocardium)* ▪ Neck veins : ± *Cannon wave*
Invest. = ECG	Fixed ↑ P-R interval (> 0.2 second) مربع كبير (All impulses from SAN pass to ventricles)	**Mobitz Type I**: *Progressive prolongation of P-R interval followed by dropped QRS (Wenckebach's phenomenon)* **Mobitz Type II**: *P waves > QRS. ↓ ratio 2:1 , 3:1*	▪ Regular Bradycardia. ▪ A-V dissociation = P >> QRS.
Treatment	1) Search for the cause.→ see b4 2) Avoid Digitalis ~~&~~ CCB	1) Cause. 2) Atropine → enhance conduction 3) Pace maker.	1) Of the Cause. 2) Atropine 3) pace maker. "the best"

Wolff Parkinson white $

Abnormal connection bet. Atria & Ventricles bypassing the AVN
→ *short P-R interval*
→ *V. Tach. ± AF may occur → collapse.*

TTT.
1) Amiodarone → ↓*conduction in accessory pathway.*
2) # Digitalis and Verapamil → ↑*conduction in accessory pathway.*
3) Radio freq. ablation pathway.

Sick Sinus $

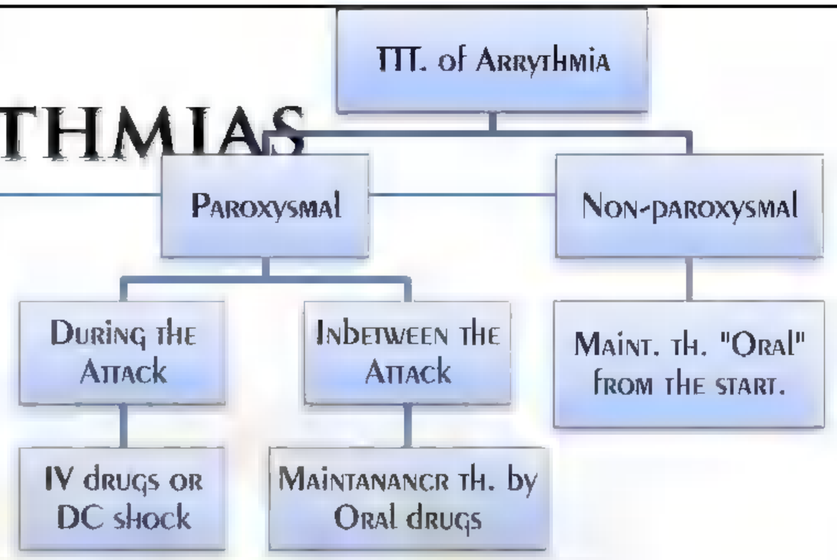
SAN disease due to degeneration, ischemia.

It may lead to :-
- *Sinus bradycardia.*
- *Sinus arrest. (Adam Stock's syncope)*
- *Paroxysmal tachycardia.*
- *Paroxysmal AF.*

➢ TTT.: pace-maker.

Causes of Systolic HTN:
1) AI.
2) Atherosclerosis.
3) Throtoxicosis.
4) Complete HB. *(dt ↑Time of V. filling + if the V. is Strong)*

Treatment of Arrhythmias



Class I → *Quinidine - procainamid - lignocaine - phenytoin . flecainide* — *They ⊖ excitability& conduction.*

Class II *BB*

Class III *Amiodarone*

Class IV *CCB. (verapamil)*

	Mechanism	Uses	S/E
1) Verapamil	CCB	PAT	*C b4*
2) Lignocaine	Na ch. blocker	V. Tach. (During the Attack)	*convulsion- confusion*
3) Phenytion	Na ch. blocker	Digitalis induced V. Tachycardia.	
4) Quinidine	(-) Atrial Foci	AF.	*Allergy - **Cinchonism** (N V Tinnitus)* *↑A-V conduction → so Add Digitalis before.*
5) B.B.	• Sotalol (β-core) ▪ Bisoprolol. • Atenolol.	**Stress Thyro.. arrhythmia:** • Sinus Tachycardia. ▪ Extrasystole. ▪ PAT.	
6) Amiodarone	CCB. K channels. Na channels.	**Anti-arrhythmic (BS)** ▪ PAT ▪ V. Tachycardia. (in bet. Attack) ▪ Dang. Extrasystoles. ▪ Wolf-Parkinson White	*• Corneal deposits → Slit lamp / 6ms.* *• Thyroid dysfunction → T_3 T_4 TSH. (mainly hypo-thyroidism)* *• IPD.*
7) Adenosine	Block SAN & AVN. *(Acts as Carotid massage + no -ve inotropic → good in HF)*	PAT. HF.	*# in HB* *(flushing, dyspnea, chest pain)*

Anticoagulants

Indications = Heart & Brain	Contraindications
1) *Recent MI – unstable angina – AF.* 2) *Cerebro vascular insufficiency.* 3) *Thrombo-philia.* 4) *DVT, pulmonary. embolism*	1) ***Liver cirrhosis**, haemorrhagic diseases.* 2) ***GIT Ulcers.*** 3) *IEC → cerebral hge.(although it us a Thrombo-embolic D. but Anti-Coagulants are for fear of rupture of Mycotic Aneurysm → ICH)* 4) ***MI + pericarditis** → haemopericardium.* 5) ***Severe uncontrolled HTN.***

	Heparin	ORAL = Warfarin
Action	⊕ AT-III	↓ Synthesis of Vit. K dep. Factors. (1972)
Controlled by	PTT = 1.5 - 2 control	PT = 1.5 control INR = (2.5 -3.5)
Antidote	protamine sulphate - fresh blood.	vit. K. - fresh blood.
Dose	✧ 1000 U / hr IV (Infusion) ✧ 5000 - 7500 U / 6 hrs (IV) ✧ 10.000 U sc / 8 hrs. (SC)	• Phenandione (Dindevan) • Warfarin.
Precautions	1) AT-III deficiency → ↓ heparin response. 2) LMWH (Clexan) → ↓ Incidence of hge. → Given without monitoring. • Th. Dose → 60-80 U/12 hr. ▪ Proph. Dose → 20 U / 12hr.	• ↓ Factor 7 after 6 hrs. ▪ ↓ factor 9 after 24 hrs. ▪ ↓ factor 10 and pro-thrombin after 48 hrs from the start of anticoagulant

heparin is started concurrently e Warfarin for 3-5 days till Warfarin reaches the Therapeutic level.

Cardiac Arrest

	V. Fibrillation	V. Asystole	Electromechanical Diss.
	(M/C) cause & the most easily treatable rapid ineffective mov. of the ventricles.	*occurs when there is no electrical activity of the ventricles*	*no effective COP inspite of the presence of normal electrical activity.*
Causes	1) ISHD 2) Electrocution 3) hypokalemia. 4) Structural heart D.	1) Adam's stock. (2nd or 3rd HB) 2) Extensive MI.	1) Tension Pneumothorax. 2) Tamponade. 3) Massive pulmonary embolism From DVT. 4) Cardiac rupture.
Diagnosis ECG	Complexes wide QRS. bizarre irreg.	Isoelectric line.	QRS without palpable pulse
Treatment	DC Shock upro 3 times ⇓ Adrenaline (1mg IV or Intra-cardiac) ⇓ DC Shock ⇓ Internal Defibrillator	DC Shock+ Atropine ⇓ Adrenaline (1mg IV or Intra-cardiac) ⇓ pace maker	1) C P R 2) Adrenaline 1 mg I V 3) Treatment of the Cause: ▪ Tension pn. → Needle in 2nd IC space MCL. ▪ pulm. Embolism → Thrombolyric th. • Temponade → Urgent pericardiocentesis.

rheumatic fever

"inflammatory disease following infection e Group A strepto-cocci

It is a multi-systemic d. affecting heart skin joints & **CNS**

Allergic theory	**Auto-immune "old"**
cross sensitivity bet. strepto-coccal Ag. & cardiac t (**N-Acetyl Glycosamine**) ⇓ production of **Abs** against cardiac t ⇓ (**so Rh. Fever & ASOT ↑↑ after 2-3 wks from Strept. Infection**)	fixation of strepto-coccal toxins to cardiac t ⇓ rendering it Antigenic ⇓ ⊕ production of **Auto-Abs**

Epidemiology:

1) **Age:** 5-15 ys. (school age)
2) **Sex:** equal (Chorea common in females)
3) **↓↓ SHINE + Recurrent strepto-coccal infection.**
4) **FH**

Diagnosis ⇒ Modified Jone's criteria

Major "cacse"	Minor
1) **C**arditis. 2) **A** rthritis. 3) **C** horea. 4) **S** C nodule. 5) **E** rythema marginatum	1) Fever 2) Arthralgia. 3) history of Rheumatic hd. 4) ↑ TLC / ESR / CRP. 5) ↑ P-R interval. (1st or 2nd HB)
Evidence of Strept infection	*1) Abs.* *2) C&S.* *3) Rcent history of Scarlet fever.*

Rheumatic fever can be diagnosed if there are

- **2 major** + Evidence of strept. Infection.
- **1 major + 2 minor** + Evidence of strept. infection.

1) If Arthritis is present → Arthralgia is not a minor?
2) If Carditis is present → ↑ P-R interval is not a minor?
3) Rh. Chorea (occurs after 6mts.) → may not be accomp. by other manif. of strept. infection.

So Diagnosis may be based on One Major Criteria only = Chorea *after exclusion of other causes of Chorea.*

"inflammatory reactions of rheumatic fever"

(all respect their latent period & sequence from the onset of strept infection)

exudative (2 wks) | proliferative (4-6 wks) | Vasculitis (2-6ms)

Arthritis
"< 6wks"

Joints are RHTS L:

- **non-erosive.**
- **Big joints - Asymmetrical:** (Knees, Hip, Shoulder, Elbow)
- **Flitting.** (as inflam. in one joint recedes, another becomes affected, 1 wk. each j)
- **Course = < 6wks.** "if > 6 wks. = Chronic Arthritis = RA / SLE"

"each joint lasts for 1wk."

⇓

Dramatic Response to Salicylates

Carditis
"pan-carditis"

Pericarditis "Dry"

⇓

sign of severity

⇓

- Stitching pain.
- Peri-cardial rub.

Myocarditis

↓conduction

ARRHYTHMIA
A-V BLOCK

⇓

↑P-R INTERVAL

↓↓contraction

↓SV

MUFFLED HS (dt loss of ms. Component)

TACHYCARDIA OUT OF FEVER (dt ↓ COP → R. ↑ HR)

1) HF IN SEVER CASES.
   → DILATATION OF HRT.
   → MI & TI.
2) GALLOP. (T + 3RD)

Endocarditis

(Affects MV/AV rare TV/PV)

Acute Valvulitis

- **Edema of MV** "TRANSIENT MS"
  ⇓
  Carey Comb's Murmur. (functional Murmur although the valve is affected but it is reversible)
- **Destruction of valve if fulminate**
  ⇓
  MI ± AI

Chronic Valvulitis On Rh Heart

⇓

change ccc. of murmur or app. of new murmur.

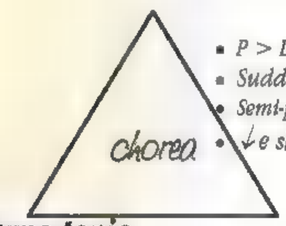
(Stenosis or Regurge)

Rh. Chorea

(Never ∎ Arthritis as it occurs v. late but can overlap Carditis OR N. ESR)

- **sex:** ♀ > ♂
- **Age:** 5-15 ys. "school age"
- **Course:** self limited (6ms.)

involuntary mov.



- P > D.
- Sudden – jerky.
- Semi-purposeless.
- ↓e sleep / ↑e stress.

hypo-tonia.

emotional instability

hypo-reflexia.

"if limb is paralyzed ..."
"chorea mollis"

Complications of Rh. HD

Acute	Chronic
HF	HF
Arrhythmia	Arrhythmia.
Sudden death.	IEC.
	Thrombo-embolic.

Erythema Marginatum
(Acute Rh. activity)

- **shape** ⇒ Reddish macule + clear center.
- **ccc** ⇒ [illegible]
- **site** ⇒ Trunk & px. extremities not in face.
- **Non-painful or Itchy** ⇒ so no ttt. is required.

SC Nodules
(Sever Carditis)

- **small – Firm.**
- **ccc** ⇒ Non-Tender & Freely mobile.
- **site** ⇒ extensor surfaces & bony prominence. (elbow, knees, chin of tibia)

Investigations of Rh. Fever

Inflammatory Disease

⇓

↑ TLC / ESR /CRP.

Recent Strept. Inf.

"But doesn't indicate Rh. fever"

Strept Abs

↑↑ ASOT

v. high titer ▬ Rising titer is Diagnostic

Other ABs

- Anti-DNAse.
- Anti- Hyalurinidase.

Anti-Streptozyme if ASOT is –ve.

Throat C & S & Rapid Ag. Detection.

Carditis

1) **X-ray** ⇒ *Cardiomegaly.*
2) **ECG** ⇒ *↑P-R interval & tachycardia.*
3) **Echo** ⇒ *pancarditis & valvular affection that doesn't appear clinically.*

prevention of Rh. fever & Infective Endocarditis

1ry prevention

- General
  - ↑↑ SHINE (Community)
- Specific
  - Early Diagnosis & Eradication of Sterpt. inf. for 10 days.

Anti-biotics	1ry Prev.	2ry prev.
Penicillin G "Crystalline" Penicillin V "Oral"	100,000 U / kg / d.	250.000 U Once ▬ Twice / day
Procaine penicillin	600,000 U / d.	
LAP "single IM inj."	< 6 ys. → 600,000 U. > 6 ys. → 1.2 million U.	1.2 million IU / 2 wks.
Erythromycin if Allergy to Oral penicillin.	40mg / kg /d.	250 mg twice/ day.

2ry prevention

Prevention of Recurrence

(LAP)

if the heart is involved	if the heart is involved
5 yrs. from the last attack	upto 25 urs. or for life

3ry prevention

prevention of IEC

Early Diagnosis & Proper TTT. of any focal Infection b4 Bacteremia

	URTI "strept viridians"		UTI / GIT	
	Amoxicillin	Erythromycin	Add IM Genta-mycin	Erythromycin or Vancomycin
Before "by 1 hr"	*50 mg/kg*	*20 mg/kg*	2mg/kg initial dose. Before only	
After by 6hrs for 2d	*25 mg/kg/...*	*10 mg/kg/...*		

Ttt of rheumatic fever

strept-infection

⇓

Eradication of strept. infection

⇓

Antibiotics for 10 days

as 1st [illegible]

"4 types of penicillin"

inflammation

Arthritis

⇓

Salicylates

"anti-inflam. to stop the process % anti-analgesic"

⇓

100 mg / kg / D

↓ *till clinical improvement (1-2 days) or ESR ↓ to (N)*

75 mg / kg / d for 4 wks

if ass. ε Carditis ... *Then gradual withdrawal to avoid* **Rebound Arthritis.**

⇓

Add Precautions to GIT upon dr high dose Salicylates:

1) Divide into 6 doses.
2) H_2 blockers & PPI.

Carditis

Mild to Moderate ← **Salicylates**

(no.....)

Sever

(Cardiomegaly / HF)

↓

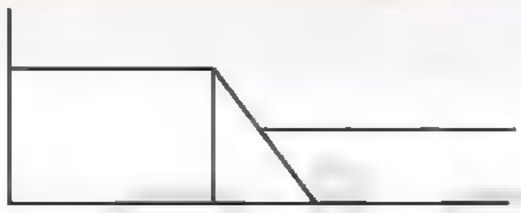
Steroids

2mg/kg/D max 60mg

"for 4-6 weeks or till (N) ESR"

⇓

gradual withdrawal over 2 wks + give salicylates (1 wk before end of steroids & 6 wks after) to avoid rebound Arthritis.



3 Stages:

1) FDS.
2) Salicylates + Gradual Withdrawal.
3) Salicylates only

Chorea

"no need for anti-inflammatory bec self limited & no residual damage"

⇓

Symptomatic TTT. Only

involuntary mov.	*emotional instability*	*irritability*
⇓	⇓	⇓
haloperidol	**Phenobarbitone Chlorpromazine**	**Diazepam**

Steroids short course "to ↓ duration of TIT."

Complications

⇓

IEC & HF = 4Ds

"Steroids for Myocarditis"

- **Diuretics**
- **Dopamine – Dob.**
- **Digitalis.** "minimal role"
- **Dilators.** "Arterial"

General Measures

1) **Bed rest till → ↓ S & S - ↓ ESR ↓ CRP.**
2) **If Carditis → Rest for 6 wks. after ESR return to B.**

Infective Endocarditis

infection in the heart
"Bacteremia"

CA
- G+ve: Staph... (affects healthy valve)
- Strept. Viridans ... (affects diseased valve only)
- Staph. Epidermidis (IV Addicts / Prosthetic V.)
- G –ve: H. influenza – E.coli.
- Fungal: Candida - Aspergellus.
- Rickettsia (Coxiella burnetti)

Route
focal infection
minor surgery

- Tonsillectomy.
- Tooth extraction /brushing
- Catheter- Endoscopy.

underlying cardiac lesion

Turbulence of bl. flow
... implantation of org.

- **Congenital**: unlikely ASD "low pr. gradient"
- **Rheumatic**: Unlikely MS "low pr. gradient"
- **Prosthetic Valve**: Staph. Epidermidis

Pathogenesis
Infection of heart valves / endocardium / BVs

Bacteremia + Jet of bl.
⇓
Injury of endocardium
⇓
Large Septic friable Vegetations + Org.
⇓
Thrombo-Embolism

Cl./P of Infective Endocarditis

1) Toxemia*

"Any [illegible] in [illegible] pt. is IEC UPO"

1) [redacted] "Intermittent & low grade"
2) [redacted] "bad GC"
3) [redacted] :
   - Pale, "toxic"
   - Grade I -II max, "never drum-stick"
   - So it is Reversible.
   - Occurs in a short time. (5-6 wks)
4) [redacted] dt hemolysis & BM (-)

2) Thrombo-Embolic

Rt sided Veg.
↓
pulm emboli.
⇓
pulm. Infarction.

Lt sided Veg.
↓
1) CNS → Stroke → hemiplegia
   - Infection → Brain abscess.
   - In Vasa-vasorum → Mycotic aneurysm → rupture .. ICH → so ⊘ Anti-coag. In spite of thrombosis.
2) Retinal → sudden loss [illegible]
3) Coronary → MI ... Aneurysm... Rupture.
4) Renal → hematuria. (Gross)
5) Spleen → Soft / Tender / Just palpable dt [illegible] (IEC dt embolism / CML dt leucostasis)
6) Mesenteric → Acute abdomen

DD = PITH Spleen
- Brucella.
- IMN – IEC.
- Typhoid / hepatitis.

3) Immune Complex - Vasculitis

Kidney: MPGN → Nephrotic [redacted] → hematuria / proteinuria.

Eye
1) Retinal hge → Roth spots. "Fundus exam, ...DD"
2) Sub-conjunctival hge.

Hands
1) Splinter hge → linear hge under nails.
2) Osler's nodules → Tender nodules on finger Tips + palm.
3) Jane way nodules → painless reddish hgic patches on palms & soles.

4) Endo-Carditis

perf. of the cusps or rupture ch. tendine
⇓
Acute Severe MI / AI
"Seagull murmur"
⇓
Acute LHF
⇓
Sudden sever PVC ...PE.

Rest of Cl./P:

5) Arthritis/ Arthralagia: Big J. affected as Rh. Fever so we do invest.
6) petichea dt toxic capillaritis.
7) HSM in Coxiella burnetti.

Investigations of *Infective Endocarditis*

Inflammatory Disease

⇓

↑ TLC / ESR /CRP.

Nromo/ Normo Anemia

Evidence of Bacteremia

Blood Culture

3 samples

(aerobic / Anaerobic / special)

⇓

If (-ve) C &S due to:

1) ABS therapy.
2) Fastidious Organisms:
   (Chlamydia – Legionella – Coxiella Burnetti)

Auto-immune Abs

- CIC (↓ C_3, C_4 dt consumption)
- +ve RF

Diseases

Focal GN

⇓

Urine A.

proteinuria
hematuria

Endo-Cardiris

⇓

1) ECG ⇒ ↑ *P-R interval & HR.*
2) Echo (Trans-thoracic) ⇒ small vegetation.
   - IEC.
   - Dissecting Aortic Aneurysm.
   - ASD.

TTT. of infective endocarditis

"TTT. should be Started if IEC is Suspected"

Medical

IV Empirical ABS till C&S

- IV penicillin G *200,000 IU/kg/d*
- IV Gentamycin *3-5 mg /kg/d.*
- Anti-Staph. = Vancomycin.

After C& S Give AB for at 4-6 wks.

Surgery

if persistent fever & appropriate ABS

- *VR "prosthetic".*
- *Abscess.*
- *Large veg.*

NB: The prophylactic LAP for Rh. fever does not prevent IEC.

Prevention

"Early Diagnosis & Proper TTT. + Prophylaxis"

Procedure	Antibiotic Regimen
1) Dental or URTI under GA or LA	**Amoxicillin: 1000 mg / 12 hr.** • 2 days before procedure. • The Day of procedure. • 2 days after the procedure
• If allergic	**Clindamycin** 600mg orally 1 hr before **Vancomycin** infusion over at least 2 hrs.
2) Special-risk patients: ▪ prosthetic valve. ▪ previous endocarditis. ▪ Genitourinary procedures.	• **Amoxicillin** (IV + Oral) • **Gentamycin** 120 mg i.v. at induction + • **If Allergic: Vancomycin** infusion over at least 2 hrs.

	MS	MI	AS	AI
CAUSES **Organic**	**RHEUMATIC "almost always"** • *PART OF MULTI-VALVULAR LESION.* • *ISOLATED MS (M/C).* **OTHER ORGANIC CAUSES:** a) **Calcific MS** *in elderly, Congenital MS.* b) **LUTENBACHER'S S (Rh. MS + ASD)** c) **CARCINOID TUMORS** *METASTASIS TO LUNG, OR 1RY BRONCHIAL CARCINOID.*	1) **Rh. F – IEC.** 2) **MV prolapse.** 3) **Ischemic papillary ms .** 4) **HOCM.** 5) **SLE.**	1) *Valvular* a) **Child**: **Rh AS** almost always ass. ± MVD. b) **Old**: **Calcific AS** ± Coronary HD. Young → Calcific Bicuspid AV. c) طفل: **Cong AS** almost always isolated. 2) *sub-valvular* **AS ⇒ HOCM.** • *squatting → ↑VR → brt diabte → ↓ obst. → ↓ murmur* • *Vasalva → ↓VR → ↓ brt dibat. → ↑ Obst. → ↓ murmur* 3) *supra-valvular* **AS** • **Elfin facies.** • **MR. (William's $)**	1) **Rh. Fever** 2) **$ Aortic aneurysm** → AI 3) **Post Valvotomy.** 4) **Systemic diseases:** a) Ankylosing Spondylitis. b) **RA** → "Aortitis" c) **Marfan $.** (weak wall of Aorta) 5) **Endocarditis.** 6) **Dissection of aorta.** (Acute AI)
Functional	1) **Carey coomb Murmur:** *(Rh. activity → edematous cusps → Transient MS → reversible)* 2) **Austin Flint Murmur:** *in* **$ AI** *(Regurged bl. → ↑ diastolic pr. in LV → interferes with full opening of MV)* 3) **VSD** *dt Over flow Across MV.*	**LV dilatation** dt a) **AI.** b) **HF.** c) **Dilated cardio-myopathy.**	1) **Severe AI** 2) **Hper-dynamic circulation.**	
HAEMO-DYNAMICS				

Tight MS = MS Index < 25%

- **Symptom:** *marked Dyspnea – Orthopnea.* + **P^{++}**
- **Sign:** *prolonged Murmur* + *OS nearby* S_2
- **Invest.:** **Echo → Valve area < 1 cm.**
- **TTT.:** *pure → Valvotomy / Calcific → VR*

	MS	MI	AS	AI
➢ **Cl./P**	**Asymptomatic.** 1) ↑ LA pr. → PVC (Dyspnea….) • *Gradual onset* → *pulm. VC* → *no PND or PE except if AF.* • *early prog.* • *long duration* 2) P⁺⁺ → RV⁺⁺ "Late" → SVC. 3) ↓ COP → Exertional dr v. late bec. a) Early PVC → *Dyspnea* → *pt. can't exercise* → *no* ↓ *COP symp.* b) Late P⁺⁺ → ↓*PVC* → ↓*Dyspnea* → *so pt. exercise* → ↑*VR / HR* ⇒ ↓ *COP.* 4) Palpitations. (irregular dr AF)	1) Palpitations. (Regular dr v. load) 2) PVC due to MI & LVF **Acute MI** → ↑LA pr. > [illegible] • *Rupture ch. tendenae.* • *perf. cusps.dt IEC .* • *Rupture pap. ms. dt M. Infarction* → **Sever PVC & PE** **Chronic MI** → ↑LA dilat. > pr. *Dt gradual LA dilat. + V. OL on LV* → *LVF (late) bec. bl. has 2 pathways* 3) ↓ COP symptoms. "If sever" 4) RVF (late) → SVC.	**Asymptomatic for many ys un-like MS** **but deteriorate rapidly if symptoms develop.** **TRIAD "on exertion"** *chest pain* **on exertion dt** → ▪ ↓ COP ▪ LV++ ▪ Coronary As. (in old age) ↓*cop* **"syncope"** → **exertion dt** → peripheral VD → reflex ↑ HR but ↓ COP against AS **at rest in elderly dt** → **Ca⁺⁺ of AVN** → Adam Stock's Attack **LVF "late"** → PVC → Exertional Dyspnea	*mild* **AI** → *palpitations only.* *sever* **AI** *chest pain* **at rest dt** → ↓ DBP < 50 → ↓ Coronary filling during Diastole **palpitations** → **regular dt V. load** **Dyspnea** → **↑LV Diastolic pr.** → **Backward failure**

➢ General signs

	1) **Malar flush:** *dusky pink disc. over cheeks due to A-V anast. + Vascular stasis!* 2) PVC → *Bilat. Fine Basal Crepitations.* 3) ↓ COP signs. 4) RVF → SVC signs. 5) AF occurs (v. late) ▪ *AGG. PVC. (PND or PE)* ▪ *AGG.* ↓*COP.* ▪ *EMBOLIZATION.*	**SAME AS MS BUT NO MALAR FLUSH.**	**Plateau pulse.** **(small volume with slow-rising)** *how can you diff. bet….?!!* *Valvular* — Ejection systolic click *supra-v.* — "William $" *sub-v.* — [illegible] on pt. in squatting pos. *chest pain* → Valsalva AS → Exertional dr → peripheral VD → reflex ↑ HR but ↓ COP against AS AI → At rest → dr ↓ DBP < 50 → ↓ Coronary filling during Diastole	**Head** 1) Corrigan's sign: ↑↑*Carotid pulsation.* 2) Carotid shuddering *(S) thrill over carotid.* 3) De-Musset sign: *Nodding of head.* **UL** 4) Water hammer pulse: *If Wide pulse pr. > 80 & DBP < 50)* 5) Capillary pulsation. *Quincke's Sign. / Muller's Sign in uvula - lips* **LL** 6) Pistol shot. "On femoral a." 7) Duroziez's sign: *S & D murmurs over Femoral A. on slight pr. e sthestoscope.* 8) Hill's sign: *LL > UL by 40 mmHg.*

- **MS** → *Dyspnea (early LA++)* → *Palpitations (AF)…* ***Irregular***
- **MI** → *Palpitations (Vol. OL)* → *Dyspnea (late LA++ but v. large)* ….***Regular.***

	MS		MI	AS	AI
Inspection & palpation	**Stage of PVC**	**Stage of P++**			
• Chamber++ (Pulsations)	LA++ → pushes RV ant. near chest wall → Lt. para-st. puls.	• PA dilat. → pulsating P_2 "systolic pulse followed by diastolic shock"	• LV++ (V. load) → apex shifted [illegible] & out.	• LV++ (concentric hypertrophy) → localized apex "sustained" → "shifted in late cases"	• LV++ (S. dilatation) → apex shifted down & out.
• Thrill	• (D) on apex.	• Lt para-st. heave (RV ++)	• (S) on apex.	• (S) at base …… neck = organic AS	• ✗
• Palpable HS	• S_1 "Slapping apex" (palpable S_1 = loud amplitude d/t ↓BV in LV)	• S_2 "Diastolic shock"	• S_1 "Hyper-dynamic apex"	• S_1 "Heavy-sustained apex" "Thrusting"	• S_1 "Hyper-dynamic apex"
	Stage of RVF → SVC				
Auscultation					
1) **HS**	**Stage of PVC** 1) ↑S_1 2) OS [illegible] 1) [illegible] MS 2) [illegible] MS 3) [illegible] MS → ↑LA p. → [illegible] [illegible] of MV → [illegible]	**Stage of P++** 1) ↑S_2 (pulm. component) 2) S_4 on tricuspid. (RV++ → ↑ [illegible] RV pr. → forceful [illegible] contraction)	1) ↓S_1 muffled. 2) ↑S_2 if PVC → P++ 3) S_4 on tricuspid d/t RV++. 4) S_3 gallop on apex (LVF) in sever MI.	1) ↑S_1 ↑MS component (LV++) 2) ↓S_2 ↓aortic comp. (↓A. pr.) 3) S_4 (d/t ↑ diastolic pr. in LV) 4) S_3 gallop on apex. (LVF)	1) S_1 normal. 2) ↓S_2 aortic comp. bec. AV doesn't close (AI) 3) S_4 at apex (↑ [illegible] LV pr. → forceful [illegible] contraction)
MS: ↓S_1 1) ass. c MI 2) Calcific MS. MI: ↑S_1 1) ass. c MS. 2) MI in post. leaflet (ant. leaflet [illegible])	**Stage of RVF** → S_3 gallop on tricuspid.				
2) **Murmurs**	• Rumbling. • Mid-diastolic + pre-(S) accentuation. [illegible] • Localized at apex.	1) ESM d/t PA dilat. of PA "PV sclerosis" 2) Late → dilat. of [illegible] → PI → [illegible]	• Soft - blowing. • Pan-systolic. If post. leaflet ⇓ [illegible] & propagates to [illegible]. If ant. leaflet ⇓ [illegible] & propagates to [illegible]	• Harsh. • Ejection-systolic. • Max at A_1 [illegible] • loud • harsh • c thrill } organic AS • NB: Murmur isn't a good guide for severity of AS (bec. LVF → ↓COP → ↓intensity of murmur)	• High pitched – decrescendo [illegible] • Early diastolic. (Could shuddering is (S) thrill while murmur is early diastolic) • Max. at A_2 pt. leaning forward. Murmur at apex in AI is: a) AI. b) Functional MI (LV dilat.) c) Austin Flint murmur. (MS)
How to diff. bet. organic & functional [illegible] 1) ↑S_1. 2) OS. 3) +ve S & S.	3) Causes of silent MS: [illegible] [illegible] + MS (Lutembacher MS) P++ (Pulm. VC → ↓bl. flow to lung & lt. side) RVF (↓COP to lung → ↓bl. flow to LA)				

	MS	MI	AS	AI
Compli-cations	1) **Valve** — 1) **RF & IEC.** *"uncommon in MS dt (↓ pr. gradient across the MV + Marked MV thickening).* 2) **Calcifications.** 2) **Lt. Atrium** — 1) **AF** → ↑↑ *PVC → stasis → Ball & Valve thombus → Positional syncope.* 2) **Marked LA++** → *Mediastinal S.* 3) **P. Veins** → *PVC, AF → PE.* 4) **P. Arteries** → *P++ → early.... reversible dt Pulm. VC / late.....irreversible dt sclerosis of PV.* 5) **Bed ridden** → *DVT → P. embolism.*		**Valve + MI** 170/40 → Wide pulse (130) → peripheral signs → LV Compensated	**Valve + LVF.** AS / MS / LVF "↓ COP" → ↓ SBP → 110/40 (↓ SBP) → Narrow pulse (70) → No peripheral signs → LV Decompensated
Invest.	1) **X-ray.** 2) **ECG.**	3) **Echo** → (**Valve Lesion / Calcific / Chamber**$^{++}$ / **Pr. gradient < 50** & **Ejection fraction**) 4) **Catheter** → **PD / PO**		
➢ **Treatment**				
Medical "Mild cases & follow up"	***Mild PVC → mild Dyspnea*** 1) *Prophylaxis for RF & IEC. (low Risk)* 2) ***ttt. of Complications:*** A) *PVC → Diuretics.* B) *AF → Digitalis + Anti-coag.* C) *Remodeling → ACE-I*	✔	*ttt of Valvular AS* *no role for medical ttt. in symptomatic pt. e pr. Gradient > 50* **(BB to ↓ Tachycardia)**	✔ 1. *Narrow pulse pr.* 2. *peripheral signs not evident* 3. *localized apex.*
Surgery "Sever Cases"	**Operate Early before P^{++} in AF if the pt. is sympt. in PVC Not Responding to Drugs** **Echo** → **Calcific MS** in AS + MI → **VR**; **pure MS** → **Valvotomy.....sequalae:** **Early Re-stenosis** → *recurrence of symptoms* → *repeat valvotomy.*; **post-valv. MI** → *"post-op. palpitation "regular"*	1) **VR.** 2) ***Valvotomy b4 LVF*** • *Shifted Apex to 6th space.* • *S3.* • *S. symptoms.*	1) **VR** *"if pr. gradient = 50" ⇒ if delayed → irrev. LVF → sudden death.* 2) ***Valvotomy*** *⇒ transient improv. → Re-stenosis. (in Non-Calcific or Cong. type)*	1) **VR.** 2) **Valvotomy.**

- **Stenotic Lesions** → *↓COP → Reflex ↑PR → so avoid ACE-I (VD) as it will disturb the hemodynamics.*
- **Regurge lesion** → *dilatation → Remodeling → give ACE-I*

	Tricuspid Stenosis	Tricuspid Resurge
▪ Etiology	1) Rheumatic usually associated with MV or AV D. Carcinoid S • *Metastasis liver → Leakage of Serotonin to Rt. Side of the heart → fibrosis → TS/PS → metabolized in lung → No effect on MV / AV except if Carcinoid in lung*	*1)* RV ++ (functional TI bec. *MVD → PHT → P++ → RV++ → Dilatation of TV ring*) 2) Acute TI → IEC (esp. IV Addicts…staph) 3) Congenital TI → Ebstein's anomally
▪ C/P	1) ↓COP. 2) SVC → Congested Neck Veins → pre-systolic hepatic pulsation *de↑ RA contraction against TS during late Diastole →pre-systolic hepatic pulsation* 3) If associated with MS / TS → ↓PVC → ↓ P''	RVF → SVC: 1) Neck veins congested – Cyanolcterus. • *Cyanosis de venous stagnation* • *Icterus de Hemolyse* 2) +ve hepatojugular reflux. [redacted] 3) Ascites precox.
▪ O/E	• Mid-diastolic Rumbling. • on Tricuspid [redacted] • signs of SVC.	• Pan-systolic murmur • Rt. To Sternum. *(MI just "Leaflet" heard more by Tricuspid area but not Rt. To Sternum).* • increase with inspiration
▪ Echo	RA ++ dt TS.	a) of the cause. b) SVC → Diuretics. c) TV plication on VR if Organic TI.
▪ ttt.	1) Valvotomy (occasionally possible) 2) V.R. (often necessary)	

Pulmonary Stenosis

- **Causes:** Almost always congenital → valvular stenosis.
  Carcinoid S = sub valvular = infundibular.
- **C/P** ↓ COP (stenotic lesion)+ RV++ → RVF → S.V.C
  Chest pain (atypical) due to ↓ COP + Rt V++
- **O/E** RV+ + [redacted] Thrill (base + to the left)

S_1 → ↓↓ P_2 + Wide splitting.
S_2 → Gallop over tricuspid Area. (RVF)
S_4 → on Tricuspid area.

- ***valvular PS*** *→ejection (S) click as AS + post (S) murmur*
- ***infundibular PS*** *→Ejection Systolic murmur over PA & Lower down .(like VSD)*

Investigations Echo or Catheter → if the Pul. C = [redacted] = severe PS

ttt.	Valvular PS	Subvalvular PS
	eject. (S) click as AS	✗
	post. st. stenotic dilatation	✗
	Functional P.S	*Innocent P.S*
	Valvotomy (balloon valvoplasty)	*Resection*

	VSD	ASD	PDA	Fallots' Tetralogy
Cl./P	1) Asymptomatic. (if small VSD) 2) Lung plethora → Exertional Dyspnea *During suckling → Gr. R.* → Recurrent Chest Infections. 3) LV ++ (V. load) → Palpitations . *(Tachycardia felt by the mother)* → LVF A) ↑PVC → *(as PVC is already present dt lung plethora)* B) ↓COP → oliguria & weak cry. 4) Reverse of the shunt → Central Cyanosis → Transient Exertion crying *(↑VR to RV → RV pr. > LV → transient reverse d shunt)* → Permanent if Eisenmenger's dt P++	1) Asymptomatic. (dt ↓ bl. shunted) 2) Lung plethora → Recurrent Chest inf. 3) RV ++ → MI 4) Reverse of the shunt..... 5) Palpitations AF. **MI is present in:** a) Coronary HD. b) HOCM. c) Low ASD. (primum)	1) Asymptomatic. 2) PVC. 3) Palpitations. 4) ↓ COP. (in LL) 5) Differential Cyanosis if Eisenmenger's $. **DD of Differential Cyanosis:** (Normal upper ½ + hypoxic lower ½) a) *Acyanotic F4 = mild PS* b) *3 shunts b4 reversal of Shunt.* c) *IPD*	**Hypoxia causes:** 1) Cyanosis central shortly after birth?!! (till Ductus closes) 2) Clubbing ⇒ drum stick. 3) Stunted growth. 4) Hyper-Cyanotic spells→ & squatting. **Components:** 1) PS → most. imp. determines severity. 2) VSD → non-functioning bec. RV & LV are subjected to equal pr. during systole dt (3) 3) Over-riding of Aorta → central cyanosis 4) RV++ → mild bec. bl. has 2 pathways. (PA / Aorta)
	Inspection & palpation			
▪ Chamber ++ بالترتيب	1) LV++ (V. load) → *Apex shifted down & out* 2) P++ → PA dilatation → *Pulsating Pulm. area.* 3) RV++ dt P++ → Lt. para-st. puls. *(No VL bec. bl. reaches RV during systole & goes directly to PA → No VL)*	1) RV++ (V. load) → Lt. para-st. puls. 2) P++ → PA dilat. → *Pulsating Pulm. area.*	• LV++ *(concentric hypertrophy)* → *localized apex "sustained"* → *"shifted in late cases"*	▪ mild RV ++ → ± Lt. para-st. puls.
• Thrill	• ±(S) over Lt para-st. *(RV++)*	•	• Cont. over Lt. infra-clav. area.	• (S) over PA dt murmur of PS.
• Palpable Sounds	• S_1 *"prominant apex"* • S_2 *"Diastolic shock"*	▪ S_2 *"Diastolic shock"*	▪ S_1 "Hyper-dynamic apex"	• S_1 "Hyper-dynamic apex"
	Auscultation			
1) **HS**	1) ↑S_2 if P++ & wide splitting. 2) S_3 on apex dt LVF.	↑S_2 *dt functional PS ⇒ P++* **Wide** *e. load RBBB (ass.)* **Fixed splitting** *↑ VR e deep insp. → ↑ RA pr. → Closes the shunt but fixes RV filling , delay P_2*	1) ↑S_2 if P++ reversed splitting.	↑S_2 *(single loud)* ↑ A2 *dt↑ Aortic bl. flow + AV opens in RV → near to chest wall →* Loud ↓ P2 *Dt PS ...↓ pulm bl. flow →* Single.
2) **Murmurs**	• Harsh - Pan-systolic ± *ESM over Pulm. Area dt P+* • Max. Lt. para-sternal. • Propagated all [illegible] precordium.	• Soft - Ejection systolic ▪ Max. at PA. ▪ ± propagated to Lt. para-st. *(func. PS)*	• Continuous machinery. ▪ Max Lt. infra-clavicular. ▪ Propagated to Lt. para-st.	• Harsh - Ejection systolic *(Of PS not VSD)* • Max. at Pulm. Area *if Valvular,* or Lt. para-sternal Area *if sub-valvular.* • Propagated to infra-clav. area.

	VSD	ASD	PDA	Fallots' Tetralogy
Comp.	1) Recent Chest infections. 2) IEC ⇒ use in ASD. 3) HF ⇒ *Stunted growth.* (HF is v. rare in F_4 as bl. in RV has 2 pathways) 4) 2ry Polycythemia in pink Fallot = mild PS ⇒ mild hypoxia ⇒ polycythemia ⇒ hyper-viscosity ⇒ agg. HF & P++ 5) Eisinminger's ⇒ *(DT LONG-STANDING P++ FOR 10 YS.)* 6) DVT in Eisenmenger *1) polycythemia. 2) s. Dyspnea → bed rest. 3) SVC → stagnation of venous system.* 7) Thrombo-emboli → (Paradox.) → *DVT → Emboli to RV → Emboli shunted to LV → Systemic Embolization.* 8) Arrhythmia in ASD → (RBBB + AF)			hyper-cynaotic spells dt ↑ Pulm. Resistance dt Infandibular spasm ↑ Aortic Resistance dt peripheral VD Dt Sympathatic - Streess - Irritation Exercise - Hot weather - Infection - Acidosis *Forcing the ↓ O2 saturated bl. in RV to Aorta → cerebral hypoxia"* **(Deep Cyanosis – Tachycardia – Irritability – Excitation)**
Invest.	1) **CXR:** • DFF ▪ FF 2) **ECG.** 3) **Echo ⇒ chamber ++ /severity** 4) **Catheter ⇒ pre-operative**			**Lung oligemia:** A) *Pulmonary TB → Ask for BCG & Scar.* B) *Loss of Lung filtration → Brain Abscess.*

➢ Treatment of Congenital HDs

Medical	1) *Prophylaxis against IEC.* 2) ***Mild VSD → Follow up If Not Spont. Closed Echo for P++*** *If ↑↑ ⇓ Surgery to Avoid Eisngmenger's $.* *If no ↑↑ ⇓ Follow up + prophylaxis*	***Prophylaxis against IEC.*** *(Not required dt low pr. gradient)*	1) ***Prophylaxis against IEC.*** 2) ***Endomethacin** in neo-natal period ⇒ (-) PG ⇒ closure.*	1) Prophylxis against IEC & Cyanotic spells 2) PG-E1 infusion *(to keep Ductus opened) only in severely Cyanosed newborns till Surgery.* 3) ttt. of Cyanotic spells • Hypoxia → O_2 Therapy. ▪ Acidosis → $NaHCO_3$ ▪ Infandibular spasm → IV Indral. ▪ ↑ Aortic R. → Squatting. ▪ ↓ pulm. fl. → Morphine (pulm. VD) 4) Iron supplement.
Surgery	1) *↑↑P++* 2) *site → Membr.* 3) *size → Big.* 4) *age → 4-7 ys.*	***Surgical closure of large defect at 4-5 ys. to avoid*** ***1) Eisnmenger's $ &*** ***2) Arrhythmias. (RBBB)***	***Surgical closure even if small.*** ***(if Easy / serious comp. "Endocarditis)***	1) **Blalock-Taussing.shunt** *(bet. Lt. Subclavian A. & Lt. PA)* *done in late life in hypo-plastic pulm. arterioles.* 2) **Total correction:** best. in the 1st yr. or younger.

Fallot's Triology = (ASD / PS / RV++)

a) Huge RV+++.
b) Congested neck veins. *(not in F4 dt mild RV++)*
c) Cyanosis delayed till Reverse of the shunt.
but this isn't Eisenmenger's $ (no P++)

Co-Arcitation of the Aorta

(Narrowing of the Aorta)

Types

1) **Infantile Type:** *narrowing is **Proximal** to lt. subclavian → ↑↑↑BP in head & neck → cerebral hge. → (Incompatible with life)*

2) **Adult Type:** *narrowing just **distal** to the origin of the lt. sub-clavian. (Isthmus)*

   - **females > males; may be associated e**
     - **Turner's $.**
     - **Bicuspid stenotic AV.**
     - **Aneurysm in Circle of Willis (Berry's aneurysm)**

C/P — Hypertensive Child .... Asymptomatic

1) **BP** → **UL > LL with radio-femoral delay**
2) **LL ischemia** → Caudication pain.
3) **Suzman sign** → pulsating intercostal arteries in the back.
4) **Murmurs in cases of Coarctation:**
   - *a) **Thrill** over the back due to co-arctation.*
   - *b) **On Aortic area** Due to associated bicuspid AV **(Dilated Aorta → AI)***
   - *c) **Machinery murmur** over the collaterals. (dt ↑↑pr. gradient)*

Hypertension is dt:
1) *Co-arcitation.*
2) *Descending Aortic Ischemia → Renal ischemia → ⊕ RAS → HTN.*

Investigations: (MRI is diagnostic)

1) **X-ray** → **post-stenotic dilatation.**
2) **Aortography.**
3) **Catheter.**
4) **Rosler's sign:** *Notches in the lower parts of ribs due to ↑↑pr. of IC collaterals.*

Treatment

1) *Surgery in **early childhood** (before Glomerulo-sclerosis → persistant HTN even after Surgery)*
2) *Resection & anastomosis. ... ...*
3) ***graft** may be needed.*

- **NB:**
  - **Acquired Coarctation may occur due to trauma or Takayasu's disease.**
  - **Hypertensive child → GN / Coarcitation**

Eisemnenger's $

- ***20 % of cases*** *of shunt esp. VSD*
- ***Genetically determined*** *persistence of the fetal pattern of the pulm arterioles (abnormal ms. R.)*
- **C/P**
  - *Cyanosis – Clubbing.*
  - *P++*
  - *↓C.O.P.*
  - *signs of P++ →pulsations / dullness / S_2 ↑(P++)*
- **Investigations**
  1) *X-ray* P++
  2) *ECG* - *pulmonale*
- **ttt.:** *Surgery is of no value bec. shunt acts as a safety valve →Heart & lung transplant?!*

Diseases of Aorta

1) **Aneurysm of Ascending Aorta** → *AI dt Syphilis →aneurysm of signs.*
2) **Aneurysm of the Arch** → *mediastinal S → Aneurysm of Symptoms.*
3) **Dissecting [redacted] Aneurysm**

Tear in intima of Aorta → Bl. bursts into media of Aorta → Dissection (Thick Wall / Narrow lumen)

→ Obstruction of Aortic br. → Ischemia → **Un-equal pulse volume.**

→ Dilate of the Aortic Valve → **AI**

- **Cl./P:** **[redacted] – Un-controlled HTN ⇒ Acute [redacted]** (Radiating to back)
- **O/E:**
  1) **Un-equal pulse volume.** *(Bl. loss Off Aortic br. Openings)*
  2) **AI ⇒ Early diastolic murmur.** *(Dilatation of the Aortic root)*
- **Etiology** ⇒ **HTN + Atherosclerosis + Collagen D.**
- **Invest.** ⇒ **CT scan / MRI. "Diagnostic" – Echo "Trans-oesoph"**
- **ttt.** ⇒ **Control BP + Surgery ± Graft.**

DD.. Acute Chest pain + Shock:
1) Tension pneumo-thx.
2) Extensive MI.
3) Massive pulm. Embolism.
4) Dissecting Aortic An.

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Myocarditis

Etiology:

1) ***Viral:*** *Coxsakie. Influenza. (Myocarditis occur several wks after viral infection)*
2) *SLE, RA.*
3) *Rheumatic fever. .*
4) *Sarcoidosis.*

Cl./P of HF.

1) *Inappropriate Tachycardia + Muffling of H.S.*
2) *Manifestations of the cause.*

Invest.:

1) *ECG & Echo.*
2) *of the cause e.g viral serology.*
3) *↑Troponine and cardiac enzymes.*

Treatment: of HF + Steroids?! (Viral)

HF + Steroids?!

1) **SLE.**
2) **Rh. Fever.**

p. 116

LA Myxoma

➢ **Def.**	*Benign Tumor from the IAS encroaching the LA. (M/C 1ry tumor of heart)*
➢ **Cl./P**	▪ ***young female + positional syncope:*** *(as the pedunculated tumor obstructs the valve orifice)* ▪ ***Tumor Emboli*** *→ hemi-plegia.* ▪ ***Intermittent MS*** *(rumbling) → disappears on lying on lt. side.*
➢ **Invest.**	*Echo -* ***↑ESR***
➢ **TIT**	*Resection.*

p. 116

Mitral Valve Prolapse = (Click murmur $)

➢ **Degenerative MVD in cusps (myxomatous)**

→ Prolapse of MV cusps into LA (mostly post. leaflet)

→ abnormal V. contractions, papillary ms. strain ± MI

➢ **Causes:** **Unknown ± Marfan's S and Thyro-toxicosis**

➢ **Cl./P:** **Young female + palpitations + Atypical Chest pain.**

"dt papillary ms. strain from MV prolapsed"

Young female + palpitations + Atypical Chest pain

- **MV prolapse.**
- **Thyrotoxicosi – Anemia.**
- **Cardiac Neurosis.**

Diagnosis: ***Early Ejection systolic click*** + ***Late systolic murmur*** + ***Echo.***
(dt ballooning of cusps into LA) ***(not pan-systolic)***

➢ **Treatment:**

- ββ (prophylaxis against arrythmia & chest pain).
- Prophylaxis against IEC in significant M.I.
- VR for severe MI.

NB = All Murmurs:

- **↓ on Standing except HOCM & MV Prolapse.**
- **↑ by Exercise except HOCM**

p. 102 Cauaes of hyper-dynamic Circulation

1) Anemia
2) Thyrotoxicosis.
3) 3 Shunts = (ASD / VSD / PDA)
4) LCF → VD.
5) Beri-Beri.
6) Preganancy.
7) Drugs = Nifidpine.
8) Fever.

p. 104 hyper-tensive Child

1) GN.
2) Co-arctitaion.

p. 105 Cyanosis since Birth.

1) TGA.
2) Ebstein Anomaly → Cong. TI → Cyano-Ictrus.
3) Total Anomalous.
4) F4 ⇒ after 6 wks.

p. 106 Ebstein Anomaly

1) RA ++. (huge RA)
2) Cong. TI → Cyano-Ictrus.
3) ± ASD
4) Central Cyanosis dr shunting of bl. through ASD. (reversed Shunt)

p. 125 1ry Hyper-lipidemia = Familial hyper-cholsterolemia

- AD.
- Xanthomas - Xanthelasmas.
- Iris..."Arcus Senilis"

4 Signs of LVF:

1) Pulsus Alternans.
2) S3.
3) Bilat. Fine Basal Crepitations.
4) Shifted Apex.

Fundus Examination

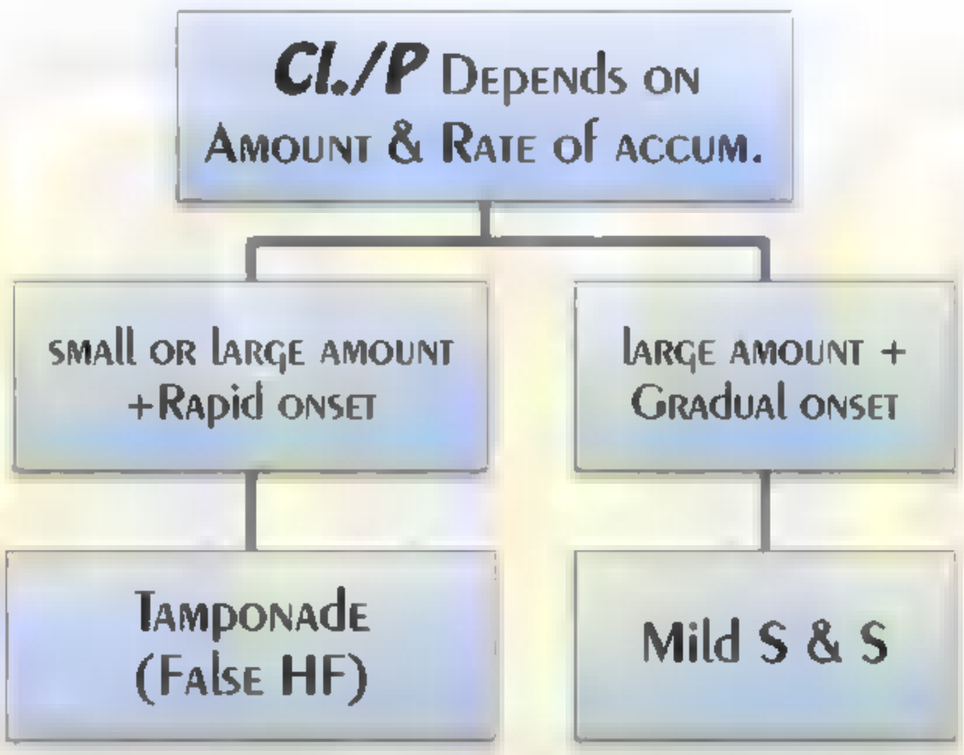
1) Benign HTN	→ Silvery Wire.
2) Malig. HTN	→ Macular Star + papilledema.
3) DM	→ Retinopathy + Vit. hge.
4) Miliary TB	→ Choroidal Tubercles
5) IEC	→ Roth's Spot.
6) Polycythemia Rubra Vera	→ Engorged Retinal V.
7) Papilldema	Brain Tumor - Pseudo-tumor. CST - CO_2 Retention.
8) papillitis	ON. (Isolated or / part of MS)

Important notes in Cardiology

Pericardial Effusion

Causes:

1) Bloody → Trauma → Rupture aneurysm of Aorta.
2) Hgic → Malignancy – TB – CRF.
3) Exudate → TB – Malig – Viral.
4) Transudate → [redacted]
5) Chylous → fluid is milky white rich in fat.



DD of Pericardial Effusion

DD of Pericardial Effusion

	Heart failure	Pericardial Effusion
Cl./P	• ↓ COP. • LVF → PVC. • RVF → SVC • NO Ascitis.	**Retro-sternal opression + Compression on** • LV → ↓ COP. • LA → PVC → *Dyspnea – Orthopnea* • RA → SVC → *Neck veins.* • Prayer position → *shift of fluids away from pulm. V. & LA → ↓PVC.* (شبه الـHF)
➢ Neck veins	✓ Congested. (↓ ε Inspiration dt (-) ve intra-thoracic pr.)	✓ Inspiratory filling. (Kaussmull's sign)
➢ Pulse	✓ Pulsus Alternans	✓ Pulses paradoxes.
➢ HS	✓ S_3 Gallop.	✓ Distant HS.
➢ Murmur	✓ MI / TI dt Dilated HF	✓ No murmur.
		percussion • dullness outside the apex ▪ ↑↑ Bare area. ▪ Ewart's sign = *Lt. intra-capsular dullness dt comp. of the Lt. lung → left basal collapse*
TIT.		
	4 Ds 1) Dopamine. Dobutamine. 2) Digitalis. 3) Diuretics. 4) Dilators.	1) Pericario-centesis. "Emergency" 2) Pericardial window. 3) Pericardiectomy. 4) Steroids to ⊖ adhesions.

▪ **Investigations**

1) X- ray → ***flask*** *shaped heart.*
2) Echo → *"best" + Determine severity.*
3) ECG → ***↓↓ voltage of QRS < 5 mm.***
4) Pericardiocentesis → *Diagnostic & Therapeutic .*

Pericardial Effusion:
1) Dyspnea – Orthopnea.
2) Neck Veins.
3) Pulsus paradoxus.

"SVC Obst. Is more common in Constrictive pericarditis"

Pericarditis

	Acute Pericarditis	Constrictive Pericarditis	Adhesive Pericarditis
Causes	1) **Viral:** (M/C & Relapsing pericarditis) • [redacted] - Echo • Influenza • Measles - Mumps 2) **TB.** Malignant. (breast / lung) 3) **Purulent:** 4) Collagen D. Uremia. 5) Rh.F. [redacted] M. Infarction	Adherence [redacted] 2 layers [redacted] pericardium Interfering with the mechanics of the. 1) TB - Viral. 2) Rh.D - Purulent. 3) Haemopericardium.	Adhesions bet. the 2 layers [redacted] the surrounding structures in mediastinum. ▪ Rheumatic fever
> **Cl./P**			
	1) Of the cause. 2) Flu-like symptoms → sudden Chest Pain (d: Viral infection) • Stitching • Retro-sternal radiating to shoulders & neck • ↑ by Inspiration - mov. - swallowing. 3) Pericardial rub.	***Cl.\P as effusion but....*** 1) Dyspnea – Orthopnea 2) Neck veins. (inspiratory filling • Kussmaul's Sign) 3) Pulsus paradoxus. (Inspiratory ↓ in BP > 20 mmHg / As Acute Sever Asthma) 4) AF. (↓ v. filling → ↑ LA pr. → LA dilatation → AF) 5) Pericardial knock = 3rd HS. ([illegible] diastolic [illegible]) 6) Ascites precox (filling of [redacted] → [illegible] → [illegible])	1) Associated valve lesions. 2) Fixed Apex + Systolic intercostal retraction → Broad bent's sing = No rotatory mov. of the ventricles) 3) As Constrictive pericarditis.
Invest	▪ [redacted] (Transmural MI – Vaso-spastic Angina / Acute pericarditis) ▪ ↑ CK if ass. c Myocarditis. ▪ Inverted T.	• X-ray → small sized heart + Ca of pericardium • ECG → ↓ Voltage as pericardial eff • CT scan or MRI → pericardial Ca^{++}	• Fluoroscopy = Dynamic X-ray (kinking of oesoph. with cardiac beat)
Ttt.	1) Of the Cause. 2) NSAIDs. (Indomethacin 25mg / 8hrs) 3) Steroids ?! (Viral) # Anti-Coagulants → [redacted].	Anti [redacted] & pericardiectomy. (DD = Restrictive Cardiomyopathy)	of the [redacted] + surgery

CardioMyopathy = Diagnosis of Exclusion

	Dilated CM (Bi-Ventricular Failure)	HOCM	Restrictive CM (Diastolic failure)
Causes	1) Alcohol – Myopathy. 2) ↓ Selenium. 3) Hemochromatosis. 4) Cyclo-phosphamid. 5) F ataxia 6) SLE – polymyositis. 7) Idiopathic.	[redacted] ..... ↑↑Thickness of IVS. ⇓ Encroach the Aortic opening ⇓ [redacted] due to LV outflow obst. = Diastolic dysfunction [redacted] MI.	1) Amyloidosis 2) Haemochromatosis. 3) Sarcoidosis [redacted]
Cl/P	Bi-Ventricular failure: ▪ Systolic dysf. ▪ ± AF & LA dilatation.	Sudden death in Young Age with +ve FH (During, or just after vigorous exertion) Criteria: • AS (sub-valvular) • Diastolic Dysf. • MI.	Of Constrictive pericarditis. • Diastolic dysf. → ↑EDP → Atrial cont. • [redacted] HS. (3rd HS & Quick pulse) • AF & ↑ LA pr.
Invest	Echo – X-ray – ECG Reversible Dilated CM: (Alcohol - Post-partum – Selenium - Hypo-thyroidism)	1) Echo. 2) Murmurs of HOCM: AS → ESM over the base • ↑ by Valsalva & ↓ HF → ↓ ventricle → ↑ Int → ↑ murmur • ↓ by Squatting & ↑ TPR → ↑ ventricle → ↓ Int → ↓ murmur 3) ECG → deep [redacted] wave.	NB (MCQ) = All Murmurs: • ↓ in Valvular & Standing, except HOCM & MV Prolapse • ↑ by exercise except HOCM
Treatment	As HF = 4 Ds: 1) Diuretics. 2) Dilators. 3) Digitalis if AF.	Avoid Vigorous exertion: 1) ββ + Verapamil → ↓↓ outflow obst. 2) Arrhythmia → Amiodarone. # VD → ↑ outflow obst. # Digitalis is → ↑↑ outflow obst. ➢ Myomectomy → ↓↓ thickness of septum.	Ventricle الـ يحرج 1) ββ + Verapamil. 2) Heart transplant & Amyloidosis.

D V T

Causes = Virchow's Triad

- **Venous Stasis** → prolonged recumbency (post-partum) or heart failfure.
- **Intimal injury** → phlebitis
- **Hyper-coagulable state "Thrombophilia"**
  1) Polycythaemia rubr. vera.
  2) Protein C,S AT-III def..
  3) Antiphospholipid Ab

DD of DVT (Tender calf ms)

1) DVT
2) Cellulitis
3) Rupture plantaris.
4) Periph Neuritis.
5) Osteomyelitis.

DVT in LL (Ilio-femoral vein)

1) LL Edema. (Unilateral)
2) Tender calf ms.
3) Tenderness along the course of femoral v.
4) +ve Homan's sign → pain in calf ms. on dorsi-flexion of foot.

Investigations Duplex scan + for Thrombophilia.

Thrombophilia

- Young Age.
- Recurrent DVT + Arterial Thrombosis.
- Thrombosis in Specific Sites. (Budd Chiari $)

Other sites of DVT

Site of DVT	Cause	Cl./P
1) Portal Vein Thr.		PH → EV / Splenomegaly / Ascites
2) Renal vein Thrombosis	1) Membr. GN. (M/C) 2) Dehydration. 3) Blood Disease	1) Loin pain & Tenderness. 2) Rapid deterioration of kid function. 3) Proetinuria. (dr ↑ Renal pr.) "Nephrotic $ → RV thrombosis → Acute severe deterioration +. loin pain"
3) IVC Thrombosis	1) Typhoid. 2) Behcet's.	1) LL edema. (Bilateral) 2) Ascites. 3) Collaterals on abdominal wall.
4) SVC Thrombosis	**Causes of SVC Obst.:** 1) Constrictive P. 2) Mediastinal mass 3) SVC Thrombosis.	1) Facial Edema + periph. Cyanosis in tongue dt venus stag. 2) Congested non-pulsating neck. V. 3) Chest collaterals. Directed from above downward.
5) Axillary V. Thrombosis		▪ Edema of the arm. ▪ Tenderness. along the course of Axillary V.

Pulmonary Hypertension

- **Pre-capillary** (pulmonary arteries and arterioles).
  - 1ry Pulmonary ++
  - Overflow
    - ASD, VSD, PDA.
      - Eisenmenger's $.
  - Obstruction
    - Thromboembolic.
      Schistosomiasis / Vasculitis / SCA
- **Capillary** (Damage to alveolar capil. mechanisms):
  - Emphysema (COPD) and IPF
    - hypoxia → VC → P++, & ↓ SA of pulmonary vascular bed
- **Post capillary**
  - (passive)
    MVD - LVF - Pulm. venoocclusive disease.

- Other Classification for P++
  - Hyper-kinetic "Over-flow"
    - ASD / VSD / PDA
  - passive
    - LVF
      MS
  - Obst.
    - Thrombo-embolic
      Shistosimiasis
      SCA
      Vasculitis
  - Reactive "hypoxia → pulm. VC"
    - COPD - high Altitude
      Sleep Apnea.

Pulmonary Embolism

Sources of Pulm Embolism
1) DVT in LL.
2) IEC of Rt. side.
3) Fat - Amniotic fluid - Air

Cl./P
(According to the size of Emboli)

Small Emboli
No Symptoms but if...
Recurrent Showers of Emboli obliterating >2/3 of vas. bed

Thrombo- Embolic P++
(Cough / Dyspnea / Discomfort)

RVF
(sub-Acute Cor pulmonal)

Moderate Emboli
Pulm Infarction
if hemodynamics of the lung are disturbed (COPD/ PVC)

1) Dry Cough & hemoptysis.
2) Dyspnea.
3) Chestpain."pleuritic"
4) fever. "low grade dt T. damage → ↑TLC"
± Crepitations

Till Invest.
"It may be"

- Pulm. Embolism e Infarction → Anti-Coagulants if No #
- pneumonia → ABS

Mass Embolism
Pulm. Embolism
"Obst. of pulm . Artery"

Acute Chest Pain + Shock (DD)

(Shock dt ↓ bl. flow to lung → ↓ VR to LA → ↓COP)
(Chest pain dt Rapid distention of PA against RV)

2) Cyanosis = hypoxia.
3) Acute RVF.

Invest.

X-Ray
1) Normal.
2) Infarction = wedge shaped opacity.
3) pl. effusion. ± PE.
5) Dilated PA.

- Pulm angio "Diagnostic but invasive"
- Spiral CT Angio + IV Contrast

Blood
↑ ESR / ↑ TLC / (hypoxia in Massive embolism)

Lung Scan
"Easy / Rapid / Cheap"

Ventilation Scan
Pt. inspires (Xenon) → Detective distribution in lung.

Perfusion Scan
IV injection of RA (Tc) → Detective Uptake by pulm. arteries

NB:
- pulm. Embolism → Normal ventilation + Abnormal perfusion.
- pulm fibrosis → Abnormal ventilation & perfusion scan.

TTT of *Pulm. Embolism* & DVT

Prophylactic

- Avoid prolonged Recumbency
  - post-operative esp. pelvic surgery (Hytrectomy / hip surgery / prostatectomy)
- Risky Pt. + Surgery
  - mini dose heparin. Or LMWH (20 mg / 12 hr.)

Resuscitation (in massive embolism)

1. O_2 Therapy.
2. Analgesics → Pethidine
3. Shock → dobutamine (RVF)
4. Cardiac massage (CPR)

Dissolve Thrombus

- Thrombolytic (if RVF)
  - Strepto kinase / Uro kinase / TPA.
    - improve pulm. Vasculatur & RV efficiency
- Anti-coagulant (to prevent DVT & Embolization)
  - Heparin
    by infusion to ↓ incidence. of hge. & maintain th. level all over the day
    - LD: 5000, 10.000 U.
      MD: 1000 IU/ h.
      Duration 7-10 d. or till clinical improv.
      Follow up by PTT (to be doubled)
  - Warfarin for 3 - 6 ms.

Hyper-Lipidemia

1ry Hyper-Lipidemia					2ry Hyper-Lipidemia
	Type	Increased	↑Blood Levels	Defect	
I	Hyper-Chylomicronemia	Chylomicrons	TG, Cholesterol	Lipoprotein	1) Endocrinal: • DM → ↑TG • Hypo-Thyroidism → ↑Cholesterol. 2) Renal: • Nephrotic $ → ↑ LDL & Cholesterol. • CRF → ↑TG. 3) Storage D → Glycogen SD. – Gaucher's D. 4) Drugs. • ββ (NS) → ↑ TG • Thiazides → ↑TG. • Alcohol → ↑TG • Steroids – OCP – Obesity.
IIa	Hyper-Cholesterolemia	LDL	Cholesterol	↓ LDL Receptors	
IIb	Combined Hyper-lipidemia	LDL, VLDL	TG, Cholesterol	↑ hepatic production of VLDL	
III	Dys β-Lipo-proteinemia	IDL, VLDL	TG, Cholesterol	Altered Apo-lipoprotein E	
IV	Hyper-TG emia	VLDL	TG	↑ hepatic production	
V	Mixed Hyper-TG emia	VLDL, Chylomicrons	TG, Cholesterol	↑ production / ↓ Clearance of VLDL & Chylomicrons.	

Drugs Therapy of Hyper-lipidemia

- ↑LDL → As. + ISHD.
- ↑TG → pancreatitis.

➢ Statins & Fibrates are unsafe to be used together → Rhabdomyolysis → ARF.

1) Fibrates	Fenofibrate. (Lipanthyl) 300 mg/d	↓TG - ↑HDL.
2) Statins	Simvastatin. (Zocor)..... Atrova-Statin. (Lipitor) .... 10-80 mg/d.	↓LDL.
3) Resins		↓LDL.
4) Nicotinic Acid		↓TG - ↑HDL.
5) Omega 3		↓TG - ↑HDL.